

Scanning - Shortwave - Ham Radio  
Equipment - Computers - Antique Radio



# **Monitoring Times**

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Volume 26, No. 2  
February 2007

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## **By Boat to Bermuda** **A Tour of ZBR** **and Bermuda Radio**

### ***In this issue:***

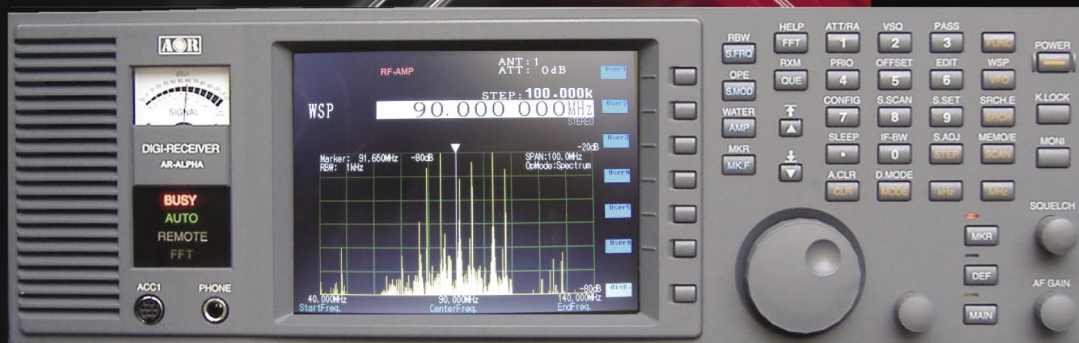
- FCC Drops Morse Code Requirement
- For better reception - Get Outta Town
- Spotlight on History Programs
- MT Compares Low-End Portables





# AR-ALPHA

## Communications Receiver



- Multi-mode unit capable of receiving AM (synchronous), ISB, RZ-SSB, USB, LSB, CW, WFM including FM stereo, NFM, APCO-25 digital, and TV in both NTSC and PAL formats
- 6-inch TFT color panel can display received video signals or depict spectrum activity over a wide choice of bandwidths including a "waterfall" function to show signal activity over a specified time period

## Welcome to the Future!

*AOR proudly introduces the AR-ALPHA, the first in a new class of professional monitoring receivers! Designed to cover 10KHz to 3.3GHz, with no interruptions,\* this receiver features a 6-inch color TFT display, five VFOs, 2000 alphanumeric memories that can be computer programmed as 40 banks of 50 channels, 40 search banks, a "select memory" bank of 100 frequencies, and a user designated priority channel. It includes APCO-25 digital and a DVR with six channels that can record up to a total of 52 minutes audio. Monitoring professionals will appreciate the world class engineering and attention to detail that makes the AR-ALPHA such an amazing instrument.*

- Composite video output on the rear panel of the unit
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- CTCSS and DCS selectable squelch functions
- DTMF tone decode
- Built-in voice-inversion descrambling
- CW pitch control, AGC, AFC
- Auto-notch feature
- User selectable spectrum display function from 250 KHz through 10 MHz in 1 KHz increments. Above 10 MHz bandwidth, it can display 20 MHz, 50 MHz, 100 MHz or 1 GHz, but above 20 MHz bandwidth, no audio will be available
- Resolution bandwidth is also user-selectable in increments of 1 KHz, 4 KHz, 32 KHz, 64 KHz, and 128 KHz.
- Fast Fourier Transform (FFT)
- Rear panel connections include 12 VDC power, RS-232C, USB 2.0, I/Q output with 1 MHz bandwidth, two antenna ports (one SO-239 and one Type N) and up to four antennas may be selected through the receiver's controls with the optional AS5000 antenna relay selector.
- Use desktop or with 19" rack mount

*The AR-ALPHA redefines excellence in professional monitoring receivers. No wonder so many monitoring professionals including government, newsrooms, laboratories, military users and more, rely on AOR.*



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# EXTERNAL OR INTERNAL?

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**WR-G305i receiver: No clutter on your desk**

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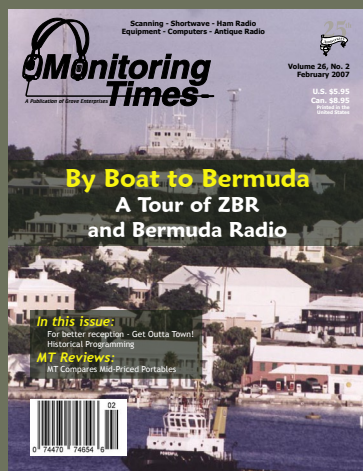
These receivers are designed for demanding applications where the ability to locate even the weakest signals in background noise and extract the cleanest possible audio is important. Their excellent hardware parameters and extensive software support define a new standard for communications intercept and monitoring tools.

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- Tracking front-end filters
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- Fast scanning speed
- Multiple squelch modes
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- Accurate S-meter
- Adjustable IF bandwidth
- Adjustable digital audio filter
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## Cover Story

### A Visit to ZBR Bermuda Radio By Ron Walsh

On a recent visit to Bermuda, Ron Walsh was privileged to arrange a tour of Bermuda Harbor Radio while in St. George's. Not only did he get a look around their busy hub of radio traffic, but he got to swap stories with a great bunch of "radio people."

ZBR has many more duties than monitoring harbor traffic as a Vessel Traffic Station – it is a Coast Radio Station, a Global Maritime Distress and Safety System station, Rescue Coordination Center, registry contact for emergency beacons for boats and aircraft in the area, and they even handle air traffic when the airport is closed during the night.

On our Cover: St George's Harbor with ZBR in the background. Photo by Ron Walsh.

## C O N T E N T S

### DXing from Bermuda..... 14 By David Parmet

Another MT reader took a trip to Bermuda planning to see what could be heard on the medium and short wave broadcast bands while there. Even though his listening was casual, without the intense preparations of a DXpedition, it netted logs that would have been rare DX from his home location. "Like they say in real estate," says the author, "it's all about location, location, location."

### Get Outta' Town!..... 15 By Ron Parks

Speaking of location ... Ron Parks points out that to improve your signal strength, all you have to do is to reduce the ambient noise by getting out of town! And it doesn't require fancy equipment to greatly improve your results – just knowing when and where to listen.

### Aviation Radio in Labrador..... 18 By Bert Huneault

This is an "editor's pick" excerpted from a story which was published in Monitoring Times back in 1985. In that two-part series, Bert Huneault recalled his first job around 1947 when he was posted at a remote location in western Labrador. Fresh out of Marine Radio School, it was probably a hardship post, but that northern adventure began his interest in aviation, weather, and propagation – all three of which have remained life-long hobbies.

## Reviews

By popular request, we are beginning a series which compares the strengths and weaknesses of several low and medium-priced shortwave receivers. We didn't expect any surprises, but we've already been surprised by this first test, which pits the Kaito KA1102 against the Eton

S350DL. (See page 68.)

On page 72, John Catalano looks back over some of the software programs he's reviewed over the past couple of years to check for updates and most recent versions, so you can see what features have been added, what issues resolved, etc.





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# hello earthlings!

E1

## AM/FM-stereo/Shortwave Radio

- Frequency Coverage: 100-30,000 KHz, includes shortwave, medium wave AM broadcast band and longwave; 76-90, 87-108 MHz FM broadcast band
- Reception Modes: AM, FM-stereo, Single Sideband (selectable USB/LSB) and CW
- Digital Display: large 5.7 inch square, 240 x 320 pixel, dot matrix display. Shows all modes and selected functions
- Programmable Memories: 500 user programmable with alpha labeling plus 1200 user definable country memories, for a total of 1700
- Digital Phase Lock Loop (PLL) Synthesized Tuning with Direct Digital Synthesis (DDS) for drift-free frequency stability and finest tuning resolution
- Dual Conversion Superheterodyne Circuit: results in minimized interference through superior selectivity
- Excellent Sensitivity: yielding a true high-performance receiver
- High Dynamic Range: allowing for detection of weak signals in the presence of strong signals
- Selectable Bandwidths: 7.0, 4.0, 2.5 kHz for excellent selectivity



- Single Sideband Synchronous AM Detector: selectable USB/LSB or double sideband to minimize adjacent frequency interference and fading distortion of AM signals
- IF Passband Tuning: an advanced tuning feature that functions in AM and SSB. Greatly helps reject interference

E5

## AM/FM/Shortwave Radio

- FM-Stereo, AM and Full-Shortwave Coverage (1711-29999 KHz).
- PLL Dual Conversion AM/SW Circuitry With SSB.
- 700 Programmable Memory Presets.
- FM Station Auto Tuning Storage (ATS).
- Alpha-Numeric Four Character Memory Bank Labeling.
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- Selectable 9/10 kHz AM Tuning Steps.
- Clock, Sleep Timer and Four Programmable Timers (for alarm or wake-up).
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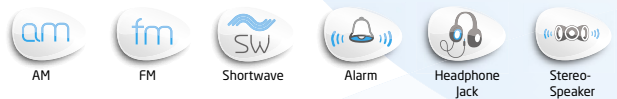


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## E10

### AM/FM/Shortwave Radio

- FM Frequency Range: 87 - 108 MHz (For North America); 76 - 108 MHz (For Japan)
- Shortwave Frequency Range: 1711 - 29999KHz
- 9/10KHz step selector for Medium Wave (AM) reception
- 1/5KHz step for the display of Shortwave
- SW IF SET feature, shifts the intermediate frequency to minimize interference during shortwave reception
- Shortwave antenna trimmer
- ATS (Auto Tuning System) for the automatic memory storage of FM/MW stations
- Auto-Scan and manually scan stations stored into memory
- Fast/Slow tuning rate selection for manual tuning
- Snooze Function: 10 minutes, repeated three times

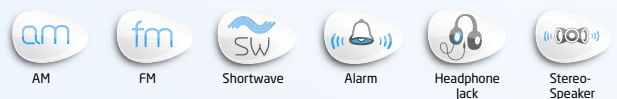


- FM Stereo/Mono selection
- High/Low Tone Control
- LCD Backlight With User Control
- Built-in Ni-MH battery charger
- System Set Codes

## E100

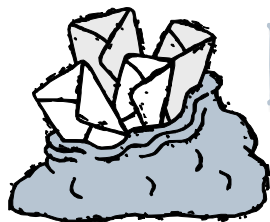
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- Full featured Digital Tuner in extremely small size
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- Direct Keypad Frequency Entry
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# LETTERS TO THE EDITOR

## Congratulations Monitoring Times!

"Happy 25th Anniversary! ...

"I'm looking forward to the article reprints. Over the years I found the how-to, hands-on, let's built it type articles very useful. For example an EMF/RFI power strip, expanding the FRG-7700 memory, a multiband 300 TV wire antenna, etc. Please reprint these types of articles.

"I also like the station history articles and the odd ball station stories.

"Looking forward to another, and more, 25 years."

— Kraig Krist, KG4LAC

"Very enjoyable issue – congratulations to Bob and family and staff for making it to 25 years. Great magazine, great store, and just a pleasure to see your stuff rolling along."

— Lee Badman, CWNA, CWSP, Syracuse University

"Happy holidays to all of you there, thanks for all the hard work you folks put forth to keep us folks up to date on events in our circles. In this day and age of email, cell phones, Ipod, internet radio, we tend to lose track of the printed word. I for one enjoy reading. I hope your mag is around a very long time yet."

— Emmitt Jackson KE5KZC

"Congratulations on publishing *Monitoring Times* for 25 years. I believe this is quite an accomplishment given the number of radio hobby related magazines that have stopped publications in the last 20 years (*Wireless World*, *Practical Wireless*, *Radio Electronics*, 73 and so on).

"My subscription to *MT* started with Vol-1, Nr-3 and I have been a continuous subscriber ever since. I find *MT* very informative and a useful monitoring tool. I subscribe to most of the 'other' radio magazines including some professional journals and believe that *MT* is the best of the lot!

"Some comments on the article 'A Visit with Bob Grove.'

1. I attended all the *MT* radio expositions in Atlanta. I enjoyed the conferences so much that I was willing to travel across the country and spend about \$1000 to attend each one. Too bad they ended up being a money losing activity for your company and had to be cancelled. In my opinion, no other conference has adequately replaced the *MT* convention.
2. You state that *MT* is a 'must read' for federal intelligence agencies. I worked for the US Government for over 30 years and I can vouch for the truth of this statement. Not only did I read *MT* but I also encouraged my employees to do likewise.

"Your article 'Growing up with Radio' was very interesting. From the few dates that you give in the article, it appears that you and I are about the same age. I find it amazing that your early life is almost identical to my childhood. If your story setting was changed to a farm in rural Arkansas

and names of 'elmers' changed, it would be my history up to the time I started college.

"After high school I believe our histories differ significantly. I majored in electrical engineering in college. After graduation, I entered the Army Signal Corps and spent a few years on active duty. After the army, I took an engineering job with the US Government as a civil servant. I worked in the communications and signal intelligence areas for 32 years and retired. During this whole time, I never lost interest in the radio monitoring hobby."

— Robert Bennett, Las Cruces, NM

"On this auspicious occasion I offer my heartiest felicitations to all the staffs and worldwide readers of *MT*. It is a great success of *MT* to celebrate 25th anniversary. I wish *MT* will continue serve better to its readers and achieve the highest appreciation. Please keep up the greatest performance."

— Md. Azizul Alam Al-Amin, Bangladesh

"Wow: Have been reading *Monitoring Times* for 25 years.

"Of course we had to enter 'name the cover story contest.' It has been a lot of years since I looked at Volume 1, Issue 1, but knew exactly where it was and will re-read it this weekend. Will send you a picture in a couple weeks holding up your #1 issue. And of course, I have all 25 years of *MT*. Would take a little time to find a certain year, but I could.

"You asked for suggestions: ask your readers to send a picture with Volume 1, Issue 1. Would be interesting to see how many are out there.

"I had to tell my research chemist daughter about your 'safe explosive.' It would be hard to explain her reaction!

"Best wishes for another 25 years."

— Joe Bodoh



## More on "Growing Up with Radio"

"Just finished your article in Dec issue of *MT*. DEJA-VU!! Been there done that.

"My father years ago got involved in radio by taking a course from National Radio Institute. He started repairing auto radios and TVs. The bug bit me. I got involved and proceeded to get an FCC 1st phone and work in avionics.

"Anyway there is one observation (not a correction) of something in your article. You used the word capacitor. Back then I believe they were called condensers.

"Keep up the good and terrific work. Never a dull moment."

— Tom Humes

"Your article brought back many memories. I have no problem picturing that Tungar Bulb in my memory (and the sound of it breaking.)

"Without writing pages, my childhood was about the same. So many good things in those trash cans! Now I wish I had saved some of them.

"While I learned radio and antennas, my thoughts turned to telephones. I have built crystal sets to 1-tubers, and the last big kit was the Heath-kit Color TV. I taught Middle School Industrial Arts, Electricity and Drafting, then later went into Telecommunications.

"Yup, I have cooked hot dogs and all that other stuff. I found a Ford Coil in the trash a few months ago, rescued it, do not know what to use it for, but could not see it going to some dump. Now I have the time to build more stuff; just got the Ramsey catalog in the mail and the kits sure look tempting.

"Thanks for the memories."

— Colin Chambers, Huntington Park, CA

"I remember as a boy, listening to a Sears Silvertone radio my grandfather gave me, and hearing SSB hams and not being able to understand them. I then remember reading an article on how to make an external BFO that would clip to the telescopic antenna and inject just enough signal to recover SSB signals.

"I have just recently been looking into finding that circuit and have not had any luck locating anything even close. Is there someone that manufactures one or is there a circuit that I can build to do the same thing?

"After almost 30-years raising a family and having put my hobby on the sidelines for most of that time; I am getting back into it. I enjoy reading your publication and learn something everyday. Thanks for keeping it going!"

— De N3DNQ

(So far, we've had no success identifying his circuit -- Do any of you readers have ideas? - ed.)

"I loved reading about your adventures and mishaps in the current issue. Some of your experiences struck home with me. Comparing your early experiences with mine, I think you

really outdid me!

"I purchased a model T spark coil for 50 cents and fried a few flies and other insects as well as interfering with my neighbor's radio that he liked to play at full volume.

"My first radio was a one tube kit from Philmore using a #30 tube. When it didn't work, I was also a victim of acid core solder!

"At age 13 I went to Boy Scout camp for 6 weeks at a cost of \$6.00 a week including food and all activities. There was no electricity so I brought my Philmore crystal set along with about 50 feet of antenna wire. One day after returning from swimming, I was upset to see that my fellow boy scouts had converted my antenna to a clothes line.

"One more experience was while attending the Philadelphia School of Wireless and living in a YMCA, \$4.50 a week. My brother in law recently returned from overseas with the Army, gave me a German Wehrmacht hat with a swastika. A ham offered to trade a National SW3 receiver. I jumped at the chance. I had a power supply and acquired more coils for complete coverage. Shortwave listening was lot different then. When you listened to Germany or Japan, that was real. Relays didn't exist.

"I love reading *Monitoring Times* and Ask Bob.

— Alvin Dattner

"I really enjoyed reading about your younger days in the Cleveland area. I grew up not far away, near the intersection of Lorain and Triskett on Cleveland's west side.

"Greg and I had fun comparing his youthful experiences to yours. His laboratory began around his chemistry set, too, but it was made by Gilbert. He knew your 'safe explosive' by the name of tri-iodide. He also had loads of fun with a replica Model T spark coil, including lengthy demos in his Jr. High science class. The teacher actually allowed him to shock someone, knocking them on their rear end! I bet that wouldn't fly in today's school systems.

"We actually are taking our own nostalgic trip down memory lane, as he wants to show me how boys in the 1940s and '50s would construct model electric motors from nails, tin cans, and wire. We traveled to Cincinnati to visit the basement stacks of the public library and checked out several books detailing electrical experiments for boys. (These vintage books are fantastic!!) I got my first motor running yesterday!

"One question: Every single book author talks about "soft iron," to be used as the motor armature. They say that steel will not work because it would retain its magnetism instead of loosing it instantly. Well, I used steel, and it does work. But I am curious about the old term 'soft iron.' They make it sound like a common, household metal, that anyone would have laying around. Do you think iron really could have been so common many years ago? Or could the term have been a misnomer for mild steel, sort of like 'tin' cans or 'tin' foil? Any idea?

"Thanks for recounting the memories of your youth."

— Judy WIORO, Union KY

"Yes, nitrogen tri-iodide it was, and delight-

ful stuff to play with! It made a puff of red smoke when it detonated, and even a speck of dust would seem to set it off!

"So far as 'soft iron,' this is the non-annealed stuff that nails are often made from. Its more randomized, non-crystalline, molecular structure easily aligns with a nearby magnetic field, but once the field is removed, the molecules become more random again, so it doesn't hold its induced magnetic polarization.

"Have fun with that little motor—I remember those experiments well!"

— Bob

## CORRECTIONS

### Niagara Falls

"I made a slight mistake and you printed it in the November 2006 *Letters* column. I should try and type this stuff without my glasses on; tri-focals can throw you off.

"Air Traffic over the Falls should be 122.050 not 121.050. This was brought to my attention by two of the air services in the process of a conversation they were having.

"Also minimum altitude over the Falls area is 3500 ft, and they fly in a 'Race course' righthand turning. Aircraft that can be seen at times are: C-130's, C-135's, various USN and USAF fighter jets, also one lone RCAF Avro Lancaster (painted flat black)."

— Dave Martin

### Studio Transmitter Links

"I was very surprised to see the information on monitoring broadcast Studio Transmitter Links in the December *Scanning Report* column, since the ECPA specifically prohibits monitoring Part 74 Auxiliary Broadcast services including STL.

"I certainly don't need to tell you about the ECPA. Your heroic but futile efforts to educate our lawmakers about the stupidity of this law are certainly well known and appreciated. My understanding of *Monitoring Times* policy, while critical of such laws, is to inform readers of activities that are prohibited and certainly not to encourage monitoring of 'forbidden' transmissions.

"This is why I was surprised at your apparent change in editorial policy in publishing this article.

"On a more positive note — Congratulations on the 25th anniversary of *MT*. Its longevity is a symbol of its success. I have been a regular reader since Volume 3 Issue 4. I have been a ham since 1960 and involved with commercial radio since 1962. Once I became aware of *Monitoring Times*, it has been a consistent source of useful information to me."

— Dick Holbert, K2HZ

While Larry Van Horn and I did read the law and thought those broadcast auxiliary frequencies were fair game, Bob Grove and Dick Holbert set us straight!

Bob said, "I don't think there is any controversy here; it is my impression that studio-to-transmitter links (STLs, now called Broadcast Auxiliary—Part 74, Subpart D) are specifically included in the prohibitions of the ECPA (Revised). I'm not sure why this is, but it may have something to do with the fact that these links may also be used for

intercommunications (studio cues, etc.), or the fact that the STL may not contain commercials which pay for the transmission, so this could be considered theft of services. Just guesses on my part, but I do think monitoring them is illegal, but never enforced.

"The definitions in the ECPA are very specific that Part 74 stations are NOT "readily accessible to the general public" and thus prohibited except for non-exclusive two-way frequencies (i.e. - some remote pickup channels shared with the business services)

(16) "readily accessible to the general public" means, with respect to a radio communication, that such communication is not—

(A) scrambled or encrypted;

(B) transmitted using modulation techniques whose essential parameters have been withheld from the public with the intention of preserving the privacy of such communication;

(C) carried on a subcarrier or other signal subsidiary to a radio transmission;

(D) transmitted over a communication system provided by a common carrier, unless the communication is a tone only paging system communication; or

(E) transmitted on frequencies allocated under part 25, subpart D, E, or F of part 74, or part 94 of the Rules of the Federal Communications Commission, unless, in the case of a communication transmitted on a frequency allocated under part 74 that is not exclusively allocated to broadcast auxiliary services, the communication is a two-way voice communication by radio;

"Since it can be argued that the whole premise of the ECPA is not rational, attempts to rationalize a prohibited activity on the grounds that the communications are ultimately intended for broadcast are futile. The law is specific: If it is an exclusive Part 74 subpart D, E or F frequency, it is 'forbidden.'

"In reality, there are many Part 74 stations in these bands that carry network feeds and other information between studio locations and remote satellite feed points. Some of this material is not intended for broadcast to the public.

"Again, I do not like the ECPA, and would support any efforts to amend or repeal it, but it is the law and I believe that ignoring its restrictions or naive comments that it does not apply are inappropriate."

— Dick Holbert

P.S.: I think it is "never enforced" because there is no way to detect a violation until the day that someone posts on the internet that they can receive something like a blacked out sporting event on a Part 74 frequency. Then the witch hunt will begin!"

*This page is open to your considered comments. Opinions expressed here are not necessarily those of Monitoring Times. Your letters may be rephrased or shortened for length and clarity. Please mail to Letters to the Editor, 7540 Hwy 64 West, Brasstown, NC 28902, or email editor@monitoringtimes.com*

*Happy monitoring!*

*- Rachel Baughn, KE4OPD, Editor*





# COMMUNICATIONS

"Communications" is compiled by editor Rachel Baughn KE4OPD ([editor@monitoringtimes.com](mailto:editor@monitoringtimes.com)) from news submitted by our readers. Thanks to this month's fine reporters: Anonymous, Bob Fraser, Emmitt Jackson, Hank, Norman Hill, Rick Kissel, Alan Masyga, Jerry None, Ira Paul, Mike Reynolds, Doug Robertson, Brian Rogers, Gayle Van horn, Larry Van horn, Dan Veeneman, Ed Yeary, George Zahn, ARRL, RadioWorld NewsBytes.

## GOVERNMENT AND MILITARY

### FCC Drops Morse Testing!

In mid-December, the Federal Communications Commission adopted the long-awaited *Report and Order (R&O)* in WT Docket 05-235, the "Morse code" proceeding. The change removes the Morse requirement for all license classes, including Extra Class. All Technician licensees will now have equal HF privileges, not just the so-called Tech-Plus.

Typically, the effective date of an FCC order comes 30 days after its publication in the *Federal Register*. If that's the case, the new exam requirement will likely go into effect sometime in February 2007.

The list of countries dropping the Morse requirement has been growing steadily since 2003. A number of countries, including Canada, the UK and several European nations, now no longer require applicants for an Amateur Radio license to pass a Morse code test to gain HF operating privileges.

### ARRL Appeals BPL

The American Radio Relay League is appealing to the radio community to turn their outrage at the FCC's unreasonably favorable treatment of unlicensed BPL systems into generous donations to the 2007 ARRL Spectrum Defense Campaign. The ARRL is suing the Commission in the US District Court of Appeals, DC Circuit, on the ground the FCC concocted rules to – in CEO David Sumner's words – "accommodate a polluter of the radio spectrum" at the expense of the licensed users it's supposed to protect.

"The BPL rules adopted in 2004 were bad enough," Sumner stressed. "The rules adopted in 2006 are intolerable. Never before has an unintentional emitter been given a free pass to interfere with licensed radio services."

The ARRL's suit will focus in part on a new FCC rule aimed directly at mobile stations in all radio services, including public safety systems, that the Commission slipped into its August 2006 Memorandum Opinion and Order (MO&O). The new rule, §15.611(c)(1)(iii), provides that BPL operators only have to reduce emission levels below established FCC permissible limits by 20 dB below 30 MHz and by 10 dB above 30 MHz – even if that's insufficient to resolve harmful interference complaints.

In a December 6 fax to FCC Chairman Kevin J. Martin and the other four FCC members, ARRL CEO David Sumner, K1ZZ, faulted the chairman for using erroneous broadband over power line (BPL) deployment data from the BPL industry, when speaking at Georgetown University November 30. In the same talk, Martin promoted BPL's tiny share of the broadband market, while he barely mentioned wireless broadband, fiber-to-the-home, or satellite broadband.

Sumner said BPL, as a technology, doesn't warrant the kind of partiality it's been getting from the FCC. "As you know, the ARRL's concern is with the still-unresolved radio interference issues that uniquely plague BPL and not with BPL as such," he noted in conclusion. "However, it is evident that the technology does not deserve the favored treatment the FCC continues to bestow upon it, especially when its inherent shortcoming, that it is a radio spectrum polluter, escapes mention."

That pollution also interferes with the shortwave broadcast band, which lacks even the limited protections allotted to licensed amateur radio operators.

### April No Joke to CHU

Changes in international frequency allocations could force Canada's CHU time-standard signal on 7.335 MHz to go off the air, change frequency or get another license by next spring. The International Telecommunication Union (ITU) has reallocated the 7300-7350 kHz band from "fixed service" to "broadcasting," effective April 2007. CHU now operates there as a fixed service facility. CHU's other frequencies – 3.330 and 14.670 MHz – are not affected. See this month's *Utility world* column for more.

### Emergency Beacons Prohibited

The Coast Guard is reminding all boaters that beginning January 1, 2007, both 121.5 and 243 MHz Emergency Position Indicating Radio Beacons (EPIRBs) are prohibited from use in both commercial and recreational watercraft. Boaters wishing to have an emergency rescue beacon aboard their vessel must have a digital 406 MHz model.

Satellite processing of distress signals from all 121.5/243 MHz beacons will terminate February 1, 2009. Following this termination date, only the 406 MHz beacons will be detected by the International Cospas-Sarsat Satellite System which provides distress alert and location data for search and rescue operations around the world.

The regulation does not affect 121.5/243 MHz man overboard devices which are designed to work directly with a base alerting unit only and not with the satellite system.

### USAF to Replace PLBs

M2 Global Technology Ltd. has received a contract to develop an advanced Personal Locator Beacon for the U.S. Air Force. The new beacon will replace the more 15,000 aging AN/URT-33 beacons currently in service. The beacons are issued to aircrews in the Air Force as part of their survival equipment.

The new beacon will provide search and rescue satellite-aided tracking capabilities as well as multiple homing signals to help locate and rescue

downed aircrews. The beacon also will contain a GPS receiver.

### Another Military-Civilian Conflict

Cheyenne Mountain Air Force Station in Colorado Springs, Colorado, says it's unsure if testing of a new Land Mobile communication system is disrupting the same 390-megahertz frequency used by remotes for garage door openers, vehicles, television sets and even some cell phones. More than 300 people have reported problems since testing began.

However, this is an old story to *Monitoring Times*, which was the first to report on the new land mobile trunked radio systems being set up as military bases shift their communications from shared VHF/UHF spectrum space into frequencies set aside exclusively for Department of Defense communications systems from 380-399.9 MHz. The new Land Mobile systems have been coming on line since 2004, accompanied by reports of conflicts with automatic car door locks and garage door openers. Since the military is the primary user in this band, civilian users have had to find other work-arounds, such as reprogramming their remotes.

### Congress Does It Again

Just hours before adjourning for the year, Congress approved a measure that calls for \$1 billion in interoperability funds to be made available to public-safety agencies in 2007 at least a year earlier than the money would have been disbursed otherwise. The measure releases the \$1 billion in interoperability funds this year instead of waiting until after the money is raised through an auction of 700 MHz frequencies, which isn't scheduled to begin until closer to January 2008.

The bill implies the funds are to be allocated by September 30, 2007, but to whom it is to be allocated and how is not at all clear. One condition attached to the funding measure is that the money be used to deploy systems that interoperate with the 700 MHz band that will be available nationwide after TV broadcasters vacate the airwaves in February 2009.



#### It's Not Too Late

Make your plans now to attend the Winter SWL 20th Anniversary Festival in Kulpville, PA, March 8-10. Check out [www.swlfest.com](http://www.swlfest.com) for details or write SWL Winterfest, P.O. Box 4153, Clifton Park, NY 12065 for a registration form.

Public-safety officials have suggested that the interoperability funds be allocated using existing Department of Homeland Security criteria and procedures.

## BROADCASTING

### Getting in the Stream

Even though it is one of the nation's largest public radio stations, KCRW's online listeners now outnumber its local audience in Southern California.

KCRW is a leading example of how public radio stations are aggressively pushing high-definition radio, live streaming of programs, podcasting and other technology-driven improvements.

The new distribution channels are bringing in not just geographic diversity, says KCRW station manager Ruth Seymour, but people who normally wouldn't listen to public radio, or maybe any radio. When it comes to the podcasts, "they don't even know they're listening to a radio station," she says.

Cincinnati station WMKV is finding classic radio programs draw listeners, regardless of the delivery method. Station director George Zahn says, "You can check out our broadcast schedule and listen at [www.wmkvfm.org](http://www.wmkvfm.org) ... we have thousands of listeners every month from around the world who comment on our music (big bands/standards/jazz) and nostalgia (classic radio comedies and dramas/many of Cincinnati's long-time broadcast legends such as Stan Matlock, Don Herman, Bob Trumphy, Annie Wagner, and more). It's a true treasure trove for those seeking nostalgia, but the

really wonderful byproduct is that we're hearing regularly from folks from their teens into their thirties who are listening, especially for the classic radio shows! Families are really gathering around the radio again evenings for *Mystery Playhouse*, and kids are hearing these stories for the very first time!"

### New VOA Director Appointed

News media executive Danforth Austin is the new director of the Voice of America. He replaces David Jackson, who is returning to the private sector.

Austin was chairman and chief executive officer of Ottaway Newspapers, a community media subsidiary of Dow Jones & Co. He also held senior positions with The Wall Street Journal.

The Broadcasting Board of Governors, which oversees VOA, cited Jackson as one of the longest serving directors in VOA history, having served since September of 2002.

## CELLULAR PHONES

### Cellular Phones Safe

Using a mobile phone does not place you at increased risk of cancer, a new study from Denmark has found. The study, carried out by researchers from the Danish Institute of Cancer Epidemiology in Copenhagen and published in the *Journal of the National Cancer Institute*, focused on 420,000 mobile phone users, 56,000 of whom had been using a mobile phone for at least 10 years.

The researchers found no evidence to suggest

mobile phone users had a higher risk of tumors in the brain, eye, or salivary gland, or leukemia. Instead, findings show mobile phone users have the same chance of catching the disease as the general population.

A lab study conducted in December 2004 by 12 institutes from seven European countries examined the effects of mobile phone radiation on animal and human cells under laboratory conditions. Despite discovering significant DNA damage to cells, researchers were unable to conclude that these effects could be harmful to mobile users' health, saying that more research was needed to determine the potential health effects.

### Blame the Sun?

Sometimes you can blame that unexpectedly dropped cellphone call on the sun, speculates statistician David J. Thomson of Queen's University, Kingston, Ontario, Canada. Thomson has been making a strong case for the sun as a central villain in the mystery of dropped cell calls for more than a decade.

The challenge for the noted statistician is to correlate data on radio-frequency energy bursts and pulses given off by the sun (acquired by the University's new \$600,000, two-meter radio solar telescope) and those irritating moments when your cellphone suddenly goes dead—while filtering out "noise" generated by cellphones, cordless mice, cordless phones and an estimated 7,000 transmitters in the Kingston area.

The problem of dropped cellphone signals "is about as messy as they come," Prof. Thomson says.

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# A Visit to ZBR Bermuda Radio

By Ron Walsh VE3GO

*"Monday, winds 90 to 110 knots, seas inside the reefs 5 to 7 feet, seas outside the reef 30 to 40 feet, possible tornadoes."*

ZBR - Sept 10, 0040Z, 2582 kHz

The above forecast was given by ZBR, Bermuda Radio, as a 2006 hurricane approached the island of Bermuda. As I compose this article, the weather forecast for Lake Ontario is a storm warning for winds of 50 knots and waves of 20 feet, with a period of 8 seconds. It goes without saying that such weather warnings broadcast by coast stations are of prime importance to mariners.

I have been a shortwave listener since 1959 and a licensed amateur since 1976. During that time, I have heard ZBR Bermuda Radio on a variety of receivers and antennas. However, the station has a great deal more meaning to me now.

Last August, my wife Dawn and I took a cruise to Bermuda aboard the *Norwegian Crown*. We thoroughly enjoyed Bermuda and certainly plan to return. The unique cities, pink sand beaches, great food, and friendly people made our stay a wonderful experience. Our vessel was a smaller cruise vessel, so we could

visit the three major wharfs in Bermuda: St. George's, Hamilton and King's Wharf (known as Dockyard locally). Each had its own special attraction and charm.

However, like all radio enthusiasts, I had to experience the radio spectrum in Bermuda. A little preplanning allowed me to investigate both amateur and marine radio while visiting.

The first thing you notice about Bermuda are the friendly and helpful people. After a bit of research, I faxed my amateur certificate and information to the Bermuda Dept. of Communications. In a matter of hours, a very helpful Miriam Fubler emailed my reciprocal certificate

## "We are all radio people!"

Martin Williams – Chief Radio Officer

to me. I could now operate as VE3GO/VP9 while in Bermuda. You can be certain that I visited her while in St. Georges and left a little thank you gift for her efforts.

I also looked up the website for ZBR Bermuda Radio\* and got their email address. I contacted the duty officer and asked if I could visit the station during my cruise. Tom Ogg replied that it could be arranged and also gave me details as to how to reach the station. It seemed

appropriate that I was listening to ZBR's HF marine broadcast when the reply arrived. I had a reception report of that contact signed during the visit.

Since we were flying to New York, my radio gear had to be compact and efficient. I took my Icom T90A handheld and remote mike. This gave me 6m, 2m, and 70cm amateur bands and a very wide, general coverage receiver. A small Cobra marine transceiver made VHF marine listening easy. This is an inexpensive rig, but it has a very good receiver.

Last but not least, my Grundig YP400 gave me HF listening capability. I was surprised by

what I could pick up outside and even inside the cabin throughout the cruise. It surprised

me how many people asked me about listening to radio traffic; several cruise participants said they would bring a radio on future trips. I made sure to remind them that the local radio regulations of the country you are in apply. If you have any amateur equipment, take your license and obtain approval to operate before you visit the country.

## Cruising

After waiting in airports, going through customs, and a short flight, we arrived at La Guardia airport. The Norwegian cruise representative directed us to a shuttle van, which gave us a scenic tour of New York before delivering us to the wharf. (I wonder how long it takes to be able to drive in that traffic without accident?!) Boarding procedures, lunch and a lifeboat drill completed our pre-cruise duties.

As we departed New York, I used my marine radio to monitor the local VHF channels. The frequencies I had listed for New York in the October 2006 column proved to be quite correct. I was able to hear the *Norwegian Crown* radio her departure on channel 11. Channels 11, 12, 13, 14 and 16 were all active.

Being an aviation enthusiast as well, I found it interesting to see the aircraft carrier *Intrepid* on display in the harbor. A submarine, the old *Frying Pan Shoals* lightship, and other ships made interesting photographic targets. I must also admit that passing the Statue of Liberty and Ellis Island is quite a moving experience.

The following day was spent at sea, which allowed time to play with the radio. Using my Grundig and a portable wire antenna, I was able to monitor a variety of signals. Time signal sta-



Ian Brooks at the console

tion WWV came in well on 5, 10 and 15 MHz. Since I'm Canadian, I also checked Canada's time station, CHU, on 3330 and 7335. Not only did they come in strong, but I also heard the 14670 kHz signal at S-9. I seldom hear it at home, as I am too close to Ottawa for propagation on 14 MHz.

I could hear ZBR on 2582 and the US Coast Guard Atlantic weather forecast on 6501 kHz. We actually had force 5 winds that day and the vessel did roll a little. It was nice to know what to expect ahead of time from the forecast. CAMSLANT Chesapeake and some aircraft were easy to copy on 5696 kHz. I even copied the Maritime Mobile Service Net on 14300 kHz. I would love to have had an HF rig aboard to check in. Radio Canada International (RCI) was easy to pick up on all their frequencies.

I would like to see the radio equipment on board, but security has become so tight that was impossible. From some literature and looking at antennas, I could see they had the full complement of communications gear. They are equipped with Comsat Satellite terminals, Telex satellite terminals, SITOR telex terminals, VHF radio, MF/HF radio and a complete GMDSS (Global Maritime Distress and Safety System) station. Television and internet were provided by satellite. Several radars, GPS equipment and a radio direction finder (RDF) were also indicated.

## Bermuda

There was no way I was going to miss our arrival at Bermuda. With a camera and my marine VHF, I was up on deck at sunrise. It looked like a Dickens village as we approached St. Georges. Even at a distance, ZBR and its antennas were visible.

*Bermuda Harbor Radio, the Norwegian Crown requesting permission to transit the Town Cut.*

*Norwegian Crown, you may go ahead, there is no other traffic in the Town Cut. Winds are SW 5 to 10, ladder on the starboard side for the pilot.*

The Town Cut is a narrow manmade channel that leads into St. Georges harbor. There is only room for one ship to pass through. A cannon, town crier, and waving people greeted the ship as it passed. We were met by the tug *Powerful* and guided to the wharf. The use of a tug is compulsory in Bermuda.

Weather channel 2 (162.400 MHz) is used by ZBR for continuous weather broadcast. I soon learned from this that the day was going to be hotter than usual and humid. We went ashore and explored the town in the morning. Upon returning to the ship, I tried out my T90A on the local repeater. I contacted Mike VP9KK, who just happened to be a taxi driver. He said to look for the "Outbacker" on the vehicle.

## ZBR Harbor Radio

Bermuda Radio is an impressive sight sitting on top of St. George Hill. Considering the hill and the heat, I decided to take a taxi up to the station. It is on the highest point in St. Georges

and the roads wind their way up to the summit. It took time to get used to having the driver on the right side and the car on the left side of the road. I felt like a rally driver as we traversed the narrow roads. Having done some rallying many years ago, it brought back memories.

The first thing you notice about the station is that it is built on top of old Fort St. George. In fact, there are several old, recently restored cannon on the site. These 25 ton, 11 inch cannons are still aimed at the ships in the harbor. The view from here is the best in the area and I took several pictures of our ship and the city. (I have always enjoyed history, and it was interesting to study our British built, stone fortifications in Kingston in comparison to others which were built around the same time.)

The station is a restricted area, so permission to visit must be obtained. The second thing you notice is the plethora of antennas. HF, VHF, horizontal, vertical and radar antennas are everywhere. The well-maintained grounds and building testify to pride in their station.

The speedy taxi ride delivered me a bit early for my visit. Steve Pegg was just arriving to begin his shift. He introduced me to Martin Williams, the Chief Radio Officer and RCC Controller. Ian Brooks was just finishing his shift and I was pleased to meet him as well. Tom Ogg, Nick Pettit and Danny Little are the other duty officers. Although I did not meet them, I have no doubt heard them on the air. The staff uses a rotating schedule so no one gets all the night shifts.

It did not take long to realize the staff is very experienced and professional. Martin's quote that they were all radio people was quite true. Every operator has had experience as a radio officer aboard ships. Martin served 8 years as a free lance and Marconi operator. Steve had 15 years experience, mostly with P&O lines. He had a lot of service in the Pacific and we discussed the port of Whittier, Alaska, which my wife and I visited last year. Ian had 23 years service as a radio operator on (as he said), "every type of ship and in every area of the world."

I would have enjoyed spending much more time there just listening to their experiences.

## Services

ZBR is extremely busy and handles a great deal of traffic because of the services it offers.

First of all, it is a Coast Radio Station. They maintain watch on HF frequencies 2182 and 4125 kHz. The main equipment is a Scanti console. This was taken out by a lightning strike shortly before I arrived. The transmitter was to be repaired, so they were using their Sailor back-up equipment. Since they are the highest point around, lightning is a constant problem.

The station is also a fully compliant GMDSS station for sea areas A1 and A2. Thus, they have DSC (Digital Selective Calling) equipment for HF and monitor 2187.5 kHz. Their MMSI (Maritime Mobile Service Identity) is 0031000001. In sea area A2, commercial ships are required to have HF DSC equipment, and typically it extends 150 miles from the coast station. Martin said ZBR can be heard several hundred miles away.

Martin said they got a lot of accidental distress calls when the equipment was first introduced. However, that has almost stopped as people have gotten used to the equipment. They do receive a lot of test calls as ships must test their equipment regularly. ZBR does a marine broadcast on 2582 kHz at 0035Z and every four hours thereafter. They give notices to shipping, weather forecasts, outlooks, and local information.

Martin also said they get great range at night and regularly hear the Canadian coast stations, even the arctic ones. His favorite DX was hearing Perth, Australia, on 4125 kHz. If it were me, I would have found it difficult to resist the temptation to call them in the wee hours of the morning. Just another reason to see if they are truly radio people – what radio enthusiast can resist making some DX contacts?

When GMDSS came into effect in 1999, ZBR discontinued CW transmissions. However, if you look in the corner, you will see the two



*The second thing you notice at ZBR is the plethora of antennas.*





Morse keys that were used. Both British style keys, one is similar to the Marconi key used on the CSR-5 and is of 1950's vintage. The other key is bigger and of older origin. They used 500 kHz and 476 kHz for their CW traffic.

True radio people can't really get CW out of their blood: Ian even asked where the amateurs used CW so he could listen to some. I'll bet all the staff can handle 30 wpm or more.

CW has not completely left ZBR, as the old CW transmitter is what is used for their Navtex service on 518 kHz. Martin called it their most reliable piece of equipment. Even the old triple wire antenna is used for the Navtex transmissions. All good things must come to an end, however. The Navtex service is scheduled to be moved to Cooper Island, the old National Aeronautics and Space Administration (NASA) base, and updated. I will have to QSL the service with the old transmitter (one more reason to have my computer read simplex teleprinting over radio, SITOR). Navtex uses the SITOR B mode.

For many years, the HF antennas used to be held up by a large wooden mast that stood right behind the operating room. Unfortunately, this came down during Hurricane Fabian in September 2003. It gave extra impact to the forecast we heard at the beginning of this article.

ZBR also has satellite communications. You can contact them on Inmarsat C at (581) 431010010 or (584) 431010120. This invaluable service is also used at VBR Prescott near my home.

Bermuda Radio also has VHF service and they constantly monitor channels 16 and 27 for traffic. Since they are the Vessel Traffic Service (VTS) station, you can also

hear them on channel 12 as they handle the vessel movements in the Bermuda area. ZBR also dispatches the pilots on channel 12. They use a 100 watt transmitter and also have three remote receiving sites, besides the station antennas. In fact, they use the same towers as the Bermuda Police.

*Bermuda Radio, this is the Norwegian Crown. We have finished our life raft training. The rafts and crew are back aboard the vessel.*

Bermuda is one of the few harbors that allows actual in-the-water training for crews. Having done some Marine Emergency Duty (MED) courses here, I can appreciate the chance to do the life raft drill in realistic circumstances. Since the water is warm in Bermuda, I do not suppose the crew complained. Try doing that in cold Lake Ontario!

Around Bermuda there is constant VHF traffic. Besides the VTS traffic on channel 12, the tugs use channel 10 for communications. Bridge operations are on channel 13 while the Bermuda Police use channel 22. Of course, channel 16 is monitored for distress.

Channel 7 provides some very interesting VHF traffic. This is the duplex international channel 7. The ship transmits on 156.35 and listens on 160.950 MHz. A marine repeater on Gibbs Hill makes it possible for yachts to experience long range VHF communications just like amateur radio operators. Martin said it was an older transmitter that just keeps on working. The duplex channel provides for the split between transmit and receive frequencies.

Since they are the VTS station, they also have Automatic Information System (AIS) capability. This information is used as an overlay on their radar screens. Two 3 cm and one 10 cm wavelength radars give them about 30 miles coverage around the island. Ian was very kind to show me the raw data and the AIS chart overlay displays. He said it makes the job more interesting to see exactly what is going on and what ship it is. This information is also supplied to government sites, so that other operations, such as the ferries, can also see the traffic.

During my visit, I saw the Research Vessel *Atlantic Explorer* on the display. Later in the day,

I watched the same vessel dock in St. Georges. What ship enthusiast does not want to know what the traffic is? Several of my marine friends have installed AIS and I have a receiver on order. The antenna is installed and waiting.

Since ZBR is GMDSS compliant for sea area A1, they also have VHF Digital Selective Calling (DSC) equipment. They must monitor channel 70 for those calls.

Just to add to their work, all traffic is recorded. This equipment was also taken out by the lightning strike and they were on the back-up system. According to Martin, the station is being constantly upgraded.

The coast radio and vessel traffic control services traffic would keep any radio station busy. They have 5000 recreational vessels in the area during the summer to keep the operators on duty occupied. To add to this traffic, there is the migration of 1000 yachts – from the US East Coast to the Caribbean – every spring and fall. They all pass Bermuda! You can imagine the traffic and distress incidents that result. They also have yacht races such as the Newport to Bermuda race in June, which had 170 participants this year. Almost 200 cruise ships visit during the tourist season. Of course, there are many commercial ships as well. This includes container ships, local ferries, excursion vessels and even a cable-laying ship, among others. To say the station is busy is an understatement!

No interview with the staff of Bermuda Radio would be complete without asking one standard question – one that even major foreign newspapers call and ask, according to Martin. "Since they are at the end of the Bermuda Triangle, has there been any unusual radio communication?"

Martin's reply is that the traffic has been no different than what would be encountered anywhere else in the world. I have to admit that I took a picture of my wife standing beside a sculpture at King's Wharf. I didn't tell her that was the official beginning of the Bermuda Triangle until after I took the photo. Neither one of us has disappeared yet!

## Rescue Coordination

As if the station were not busy enough, they are also the Rescue Coordination Center (RCC) for Bermuda. Being a Canadian Coast Guard Auxiliary member, I was very interested to hear about their search and rescue (SAR) calls and problems. As I learned, they have the same boating problems as we have here. They respond to approximately 450 distress calls per year. These can range from a vessel taking on water to a full-scale search involving USCG aircraft. 5696 kHz USB is sometimes used.

Martin recalled one such search that involved a yacht from the province of Quebec. The may-day call necessitated working with USCG Norfolk to divert a ship to help. While this was going on, the operators were in phone contact with Joint Rescue Co-ordination



*Console showing Scanti and Sailor HF gear, as well as recorders and Navtex control*

Centre (JRCC) Trenton, Ontario, so family members could be kept aware of the situation. Trenton is our local JRCC and handles all of central Canada. It is a joint center as it handles both air and marine emergencies. Just recently, a CBC news item told of HMCS *Athabaskan* helping with a rescue within a few hundred miles of Bermuda.

ZBR's website lists the incidents they are involved with, and as you'll see, it is quite a list! (See Resources for how to get to their website, or put Bermuda Radio ZBR in a search engine.)

ZBR is also the registry contact for all the EPIRB's (Emergency Position Indicating Radio Beacons) for vessels and ELTs (Emergency Locating Transmitters) for aircraft registered in Bermuda. An unknown number of ships are registered in Bermuda, but they total over 6 million Gross Registered Tons (GRT). One of these devices is heard from one of those ships, ZBR is contacted. You can imagine how many calls that service generates.

Last but not least, they have one other duty to perform. Between the hours of 2300 and 0700, Bermuda airport is closed down. So, any emergencies or aircraft diversions during these hours are handled by ZBR. Therefore, two air radio sets are located there in the station.

As I toured the station, I noticed another marine VHF radio that was bringing in traffic. When I asked what it was for, I was told it was acting as a scanner so they could know what else was going on. I was truly talking to some "radio people!"

Believe me, I could have spent my entire vacation just observing the station. Martin, Steve, and Ian were so helpful and took their time showing me the workings of ZBR. They truly had pride in their set-up.

A look at the many antennas and a visit to



the transmitter room finished my visit. I could not resist taking some more pictures from the outside of the operating room as the view was spectacular that day. I proudly signed their guest book and had Martin authenticate my QSL for the 2582 kHz broadcast. All too soon I had to say good-bye and let these professionals get back to work.

One always says thank you and leaves a gift, when people have been so kind. My 8 by 12 photo of the local SAR cutter, *CCGC Cape Hearne*, now hangs on the wall of ZBR. (Martin was also a race fan, so a picture of Paul Tracy's Champ Car at speed was also left behind.)

I decided to walk back to the ship and enjoyed the downhill trek. While walking back, I used my T90A and brought up the IRLP link. VE3GO/VP9 was able to talk to Jim VA3JHR back home in Kingston. At least I can say I made one transmission from the site of ZBR.

## Other Marine Traffic

A ride on the ferry from Dockyard to Hamilton was also interesting. I introduced myself to the captain and said I was a captain on the tour boats in the Thousand Islands area. He asked what vessel and I replied the *Island Belle* or *Island Queen*.

Captain Carlington, or Kirby, as he is known, said he knew the vessels well as he grew up in Belleville, 40 miles from my home town of Kingston! As a result, I got to wheel the ferry for a while.

The local ferries use VHF channel 80 for their traffic.

## Amateur Radio

The hams in Bermuda are a great group. It



was like talking to the local amateurs, and they could not have been more helpful. Every time I signed on the local repeater, there was someone to have a QSO (conversation) with. The main repeater is VP9AX/r and is on 146.940 MHz, using the usual 600 kHz offset. There is a second repeater on 146.820, but I did not use it while in Bermuda. You can easily work VP9AX/r anywhere in Bermuda, mostly using low power. The IRLP node is 7995 and works well. I was able to use it several times. In fact, I used it to check into the Kingston Amateur Radio Club weekly net.

I enjoyed talking to VE3JPW Warren, VE3KFS Les, VA3ZE Tom, and Bert VE3KBW, operating as VE3GO/VP9. Actually, it was the first time I had ever used amateur radio outside Canada or the United States. I actually carried my first overseas message, as Les wanted to say hi to Tom VP9V whom he met while Tom was serving in Bermuda with the Canadian Navy.

Later in the week, I was able to contact VE3KBW, my brother, and get caught up on the details from home. My mother is 93, so it was good to learn all was well while we were away. Walter VP9KD and Glen VP9ID were also very helpful while in Bermuda. Glen operates the Radio Society of Bermuda website at [www.bermudashorts.bm/rsb](http://www.bermudashorts.bm/rsb). He also has a photo gallery there and said I could add some pictures I took. I plan to do that!

There is a Bermuda HF net on 14275 USB at 0800 eastern time (0900 Bermuda time) on Sunday mornings.

The amateur band plan for Bermuda is very similar to ours, but they have a different RF output limit. You are allowed 150 watts below 50 MHz and 50 watts above 50 MHz as a maximum.

Wherever I go, there is always a member of the amateur radio fraternity to help.

## Home, with a Difference

We departed Bermuda and I watched the antennas of ZBR fade away. Of course, I listened to their broadcasts on VHF and HF as we sailed back to New York.

As I am writing, ZBR is coming in on 2582 kHz. I am sure I recognize the voice and can picture the person at the console. A recent broadcast mentioned a drifting yellow buoy reported by the *Norwegian Crown*. This immediately brought back memories of our cruise. Both my wife and I plan to return to Bermuda, as we enjoyed the island so much. As for me, the HF broadcast from ZBR has a special meaning now. I would love to work there and be part of this professional group of "radio people"!

Resources: Bermuda Radio Online

\*Go to [www.gov.bm](http://www.gov.bm), click on Tourism and Transport, then on Bermuda Radio.

From the Website: Rescue Co-ordination Centre / Bermuda Radio  
19 Fort George Hill  
St. George's GE 02  
Bermuda

Tel: (441) 297-1010

Fax: (441) 297-1530

Emergency Tel: Dial 911 and request Marine Rescue

E-mail: [operations@rccbermuda.bm](mailto:operations@rccbermuda.bm) (Duty Officer 24 hours)

Telex: INMARSAT C (581) 431010110

Telex: INMARSAT C (584) 431010120

MMSI: 003100001 (MF and VHF DSC)

SSB R/T: 2,182 kHz or 4,125 kHz USB

Marine VHF Channels: 16 or 27

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# DXing from Bermuda

By David Parmet

A family vacation in Bermuda might bring one images of fun in the sun on the legendary pink beaches, shopping for shorts in Hamilton, and Mom and Dad enjoying a Rum Swizzle at St. George's legendary Swizzle Inn. For this SWLer, however, a late fall family trip to Bermuda was also an opportunity to try for some DX targets out of reach in my northeastern US home.

With nothing but the Atlantic Ocean surrounding it for hundreds of miles, Bermuda is ideally situated for DXing. You literally can't be more than a few miles from a beach anywhere on the island. And since the curse of overdevelopment hasn't yet hit Bermuda, RF interference is hardly a problem.

Domestically, Bermuda radio is a mixture of FM stations playing the latest hits from the US and religious broadcasters on the AM dial. The exception is BBC World Service on 1160. Bermuda is on Atlantic Time, one hour ahead of New York and four hours behind UTC. So I was not only closer to the Africans and Europeans in space, but also in time.

Since this was a family trip, DXing wasn't the only thing on my mind. So this is only a casual report; I'll leave it to more experienced DXers with serious equipment to report on the full range of signals that can be caught. But even my casual observations helped me bag some signals I'd never be able to catch anywhere else.

My equipment was a Radio Shack DX398 with modifications by RadioLabs and a Yaesu VX-7R for VHF/UHF scanning and AM and FM listening by the pool and the beach. For an antenna I brought a 100-foot roll of copper wire terminated in an RCA plug for the DX398's antenna jack (RadioLabs-installed). Since we were staying on the ground floor, I just rolled out as much wire as I could – about 30-40 feet – without attracting too much attention.

The first morning we were in Bermuda, and using just the DX398 without an external antenna, I concentrated on MW DXing. Starting at 1000 UTC, just before local dawn, I was immediately overwhelmed with MW stations from Canada (740 – CHWO), New York (WFAN and WOR both coming in just as clear as they do in my home in Westchester County, NY) and elsewhere in North America (complete list in Figure 1). I also heard stranger sounds between the North American stations – Arabic singing at 666 (ORTAS-1 from Syria) and French voices at 612 and 621.

Further morningtime MW DXing netted stations from Quebec (690 – CINF and 730 – CKAC, both in Montreal) as well as Art Bell



from Louisville, and New Orleans and New York powerhouses WABC (770) and WCBS (880).

The evenings were for SW DXing. Once the kids were asleep (around 0000 UTC), I set up my "listening post" and scanned the tropical bands. The 60-meter band was alive like never before for me. Radio Rebelde from Havana, normally a fairly easy catch for me at 5025 was coming in like it was next door. But beyond that, I caught Radio Mauritanie from Mauritania at 4845, All India Radio at

5010, as well as several Brazilians and Central and South Americans domestic stations (see chart).

The lesson is, you don't need a lot of fancy equipment for a DXpedition. Like they say in real estate, it's all about location, location, location. The combination of an ideal location, a radio, and some wire was all I needed. I'm sure other wonders would have awaited me had I had the whole weekend to dedicate to DXing, but even a family vacation offered unexpected benefits and catches.

Figure 1: Logs from Bermuda

Date	Time UTC	Frequency	ID	Comment
24-Nov	1000	580		
		612		Male Voice Fr
		621		M/F voices Fr
		640		"US Music ""Your Music, Your Way"
		660	WFAN	New York
		666	ORTAS-1	Syria, Arabic Singing
		700	WLW	NC
		710	WOR	NY
		740	CHWO	Toronto
		750	WSB	Atlanta, GA
25-Nov	0100 UTC	4799	R. Buenas Nuevas	Guatemala - Male voice Sp
		4840		India or China - Male Vocals
		4860	R. Federacion	Ecuador - M/F vocals Sp
		4920		India or China - Male Vocals
	1300 UTC	89.1 FM		Bermuda
		94.9 FM		Bermuda
		98.1 FM		Bermuda
		106.0 FM		Bermuda
		107.5 FM		Bermuda
	1500 UTC	133900	BNA	Airport Beacon
		118100	BNA	Tower / ATC
26-Nov	0030 UTC	4845	R. Mauritanie	Mauritania - Arabic Male Voice
		4875	R. Difusora Roraima	Brazil - Male Vocals
		4920	India or China	Asian F vocals - Flute music
		4925	R. Educacao Rural	Brazil - Male Vocals
		4960	unk	Male Voice Sp?
		4985	R. Brasil Central	Brazil - Male Vocals
		5010	AIR India	Asian music
	1020 UTC	690	CINF	Montreal CA - French vocals
		730	CKAC	Montreal CA - French vocals
		770	WABC	NY
		840	WHAS	Louisville, KY - Art Bell
		870	WWL	New Orleans, LA - Art Bell
		880	WCBS	NY

# Get Outta' Town!

Ron Parks WB5DYG

**Y**ou have probably heard the old question that asks: "If a tree falls in the forest, and there is no one around to hear it, is there sound?" Well, I certainly am happy to leave the debate over that one to the philosophers and others who like to argue unanswerable questions! But, I can tell you that if a tree falls in the forest and you happen to be in the neighborhood, you will be able to hear it from quite a distance away.

Most of us have been out in the woods or some other rural area and experienced that "silence so loud you can hear it." If that same tree were to fall in the city, we wouldn't be able to hear it from nearly as far away.

Why? Noise! Traffic, honking horns, construction, the roar of air conditioning and other machinery, all the sounds we are submersed in on a daily basis that we pretty much tune out and no longer notice because those sounds are there all the time. That is, until we get away from the city and notice how quiet it is out there.

If we consider the sound of the tree falling to be "signal," and all the other sounds in the city to be "noise," we can see it is the noise that keeps us from hearing the signal. What we have here is poor "signal to noise ratio." Signal to noise ratio can become rather involved from a technical standpoint, so let's skip all that and apply our simple tree-falling example and say for the record: you can hear things better out in the forest! The forest has a better signal to noise ratio.

These improved conditions don't just apply to sound; they apply to radio signals as well. Want to breathe new life into even the simplest receiver and hear signals like you have never heard before? Get outta' town!

## Life in the Big City

Many of us live in urban areas where every kind of electrical noise that can be created by our high-tech world is all around us. High powered local broadcasters swamp our receivers, computers of all shapes and sizes are everywhere kicking out noises that get into our radios, remote controls using radio frequencies beep and hum, power lines and lighting fixtures buzz – the list is endless. Add to this ever-increasing noise the restrictions on antennas in many areas that reduce our ability to capture signals, and it is a credit to our fine shortwave receiver manufacturers that we can receive any signal at all!

For those who enjoy scanner listening in the VHF and UHF frequency ranges, being in the city is the place to be. Most of the electrical noise indi-

cated above does not have much effect on scanner reception, and the signals are relatively short range, so you want to be close to the transmitters anyway. But if you enjoy conning the shortwave frequencies from below the AM broadcast band up to about 30 MHz, the electrical noise and interference in the average city can be a real factor in determining what you can and can't hear.

Just a few miles down the road from our urban homes can usually be found a state park, national forest, or other camping or picnic area where even a small portable radio and simple antenna will perform better than we could imagine. For me, camping is a favorite pastime and radio is a natural companion. On a recent trip to the Arizona Rim Country (near Payson, AZ) with my small portable receiver along, I had a ball and was utterly amazed at the signals that came booming into my ears. All while kicking back at one of my favorite campsites and lowering the noise in my mind! If sleeping out under the stars is not your thing, make it a day trip and still take advantage of gettin' outta' town for some R&R (Relaxation and Radio).

## Portable Gear

Going portable is easier than ever. When I began tinkering with radios in the early 1970s, the hardware was large, heavy, and for the most part required 115 volt "house power." A trip to the woods was a major undertaking that required strong backs and generators. We usually reserved this kind of action for amateur radio's field day once a year.

Today's portable radios will fit in your pocket and run for hours off either internal batteries or a simple external battery. Even many of the more sophisticated receivers we like to park on our radio desks will run off 12 volts from your motor vehicle and they are small and light weight.

The best thing is that the antenna does not have to be elaborate at all. Since you are headed into a relatively electrically quiet zone, a simple wire up into a tree will do the trick. If you don't want to go to the trouble of stringing up an antenna, even the simple built-in telescoping antenna on many portable radios will bask in the signals it can pick up away from the city noise. And, my GPS showed the altitude at my campsite to be 5100 feet. Now,



*A complete station including a small portable radio with homemade FlexTenna, antenna adapter cable, antenna rope, and roll up earphones packs up easily into small pouches. Pine cones optional!*



just how often do you get to put your antenna up that high?!

Speaking of antennas, I constructed the "FlexTenna" (MT March 2006) and found it to be an outstanding performer out in the wilds. This antenna is only 24 feet long, made of common zip cord, and will roll right up into a small pouch for transport. If you haven't built one yet, it is easy to make, only takes a few minutes to put together, and will provide a big improvement in your portable receiving setup (see the restricted *mtsubscribers* site at [www.monitoringtimes.com](http://www.monitoringtimes.com) for instructions to build). Or, if you prefer not to "roll your own," grab the ready to use FlexTenna from Grove Enterprises. Check it out at: [www.grove-ent.com/grovehvu.html](http://www.grove-ent.com/grovehvu.html).

## The Call of the Wild

On my latest camping trip, I used a very simple setup; my Grundig YB400PE receiver ([www.grundig.com](http://www.grundig.com)), the FlexTenna strung from my pop-up trailer up into the branches of a nearby tree using a short rope, and the radio's internal batteries for power. A pair of roll-up in-ear earphones and my watch, along with a pad of paper to do the logging rounded out my set-up. I was on the air in minutes, including throwing the rope for the antenna into the tree.

One of the first things I do when firing up a portable setup is to swing through the National Institute of Standards and Technology WWV time frequencies at 2.5, 5, 10, 15, and 20 MHz. This verifies that everything is in working order and gives me a quick idea of how reception is on different frequencies. Depending on time of day, some of the frequencies will normally be weak or not audible, but there have been times out in the electrically quiet woods I have actually copied all five of the WWV frequencies at the same time. Keep in mind also the male voice on WWV is in Colorado, while the female voice is coming to you from Hawaii (via WWVH). This will give you an even better idea of reception conditions depending on which of the voices (or both!) you can hear. More information on WWV and WWVH can be found at <http://tf.nist.gov/stations/www.html>.

The Canadian Institute for National Measurement Standards also operates time station CHU on 3.330, 7.335, and 14.670 MHz. Located near Ottawa, CHU will give you a good check for signals coming from the direction of Canada. There have been some possible changes reported for CHU, however, so check out their web site at <http://>

[inms-ienm.nrc-nrc.gc.ca/time\\_services/short-wave\\_broadcasts\\_e.html](http://inms-ienm.nrc-nrc.gc.ca/time_services/short-wave_broadcasts_e.html) for the latest information. (Also see this month's *Utility World* - ed.)

As you check out your set-up, keep in mind the lower frequencies will generally be better at night while higher frequencies will be better during the day. The seasons can make a difference as well. Winter is usually an electrically quieter time to listen, since there are not as many thunderstorms and other natural noisemakers as exist in the summer.

Here in Arizona, with everything from high country to low desert areas, the camping season is year round, so it is easy to take advantage of winter's lower noise. Folks in other areas where only the bravest of souls venture out camping in the winter, might be more likely to reserve portable operation for summer. Don't let this discourage you! I have heard some great things on summer camping trips as well. The big difference is still getting outta' town!

## Pick Your Favorites

My favorite monitoring pastimes are utility and military stations, beacons, and especially the oddball signals on shortwave such as numbers and unusual Morse code (CW) or single sideband (SSB) voice activity. By no means does this mean these are the only signals that portable operation will improve! If your passion is the international broadcasters, AM band broadcast stations, low frequency aeronautical beacons, or tuning through the ham bands, everything here applies equally to you.

I have included some sample loggings from my latest camping trip (see Table 1). There were several entries that made it into the log on this trip that I have never been able to hear at my home station in the Phoenix metropolitan area with a much better receiver and more sophisticated antenna. These signals came booming in with a crispness and strength that I would not have thought possible. The difference? You got it: lower noise!

One good example of the improvement of signals in a rural area is my reception of several pirate radio beacons reported to be planted in the Arizona and California deserts. See [www.spynumbers.com/USSWbeacon.html](http://www.spynumbers.com/USSWbeacon.html) to learn more about these strange transmitters. These stations utilize solar power and transmit at powers of around 100 milliwatts. Yes, that is only 0.1 watts! Way less power than your average night light. Several of these are stations I have never been able to hear at

all over the noise in the city, but I was able to log them loud and clear out camping.

Note there are some low frequency loggings listed that were not actually received

*Here is my radio monitoring post home away from home. This shot was taken on top of Arizona's Mt. Ord at an elevation of 6754 ft. The tailgate of the truck has also served as a great listening post on many of my shorter adventures without the trailer.*

**Table 1: Loggings from the**

### Arizona Rim Country

*Frequencies are indicated in kHz (kilohertz) and all times are Universal Coordinated Time (UTC). Voice transmissions are in upper sideband (USB) unless otherwise indicated.*

*Stations received on the Grundig internal loopstick antenna:*

- 206.0 GLS-Nondirectional aeronautical beacon, Galveston, TX. Modulated CW at 0540.
- 329.0 TAD-Nondirectional aeronautical beacon, Trinidad, CO. Modulated CW at 0607.
- 344.0 FCH-Nondirectional aeronautical beacon, Fresno, CA. Modulated CW at 0610.
- 350.0 NY-Nondirectional aeronautical beacon, Enderby, BC, Canada. Modulated CW at 0612.

*Stations received on the FlexTenna:*

- 3485.0 New York Radio-aeronautical weather conditions, at 0522.
- 4078.0 Pirate beacon in Arizona desert sending "TMP 55" indicating a temperature of 55 degrees. Very strong CW at 0621.
- 4082.0 Chit chat between two or three participants in unknown language at 0538.
- 4088.8 Pirate beacon in Death Valley sending dashes. Very strong at 0540.
- 4097.0 Cluster of pirate beacons in CA/AZ desert sending dashes. Hearing two beacons strong and one weak. CW at 0632.
- 6626.0 Pirate beacon in Mojave desert known as "Rainy". Signal sounds like a dripping faucet. Good signal at 1755.
- 6700.0 Pirate beacon reported to be in California sending dashes. Weak CW at 1801.
- 7040.0 M-Russian beacon in the 40 meter ham band. CW at 0555.
- 8010.0 Cuban numbers broadcast with a female voice. Good AM signal at 1700.
- 8097.0 Cuban numbers broadcast, five letter groups, modulated CW at 1805.
- 10101.0 Two males chit chatting just inside 30 meter ham band. Unknown language but lots of laughter. One station had a lot of background noise that sounded like an aircraft or ship. Strong at 1743.
- 11175.0 King 22 with military phone patch to Angel Operations via McClellan AFB on HF-GCS net requesting weather conditions. Phone patch was interrupted by a strong signal playing drum music! Angel operations waited for interference to clear then continued phone patch. All stations strong at 2347.

on the FlexTenna. The Grundig YB400PE uses an internal loopstick for the AM band broadcasters and low frequency band reception and this is not affected by plugging in an external antenna. Loopstick antennas are directional, though, so be sure to rotate the radio around a bit while tuning to peak the signal or null out interference.

Other receivers may allow an external antenna for these frequency bands; check your receiver's manual for details. The bottom line is you are still taking advantage of your improved signal to noise ratio no matter what antenna is in use!

## Powering Up

If your radio has self-contained batteries, you are good to go. You might want to throw in a spare







*The comfortable bunk in my pop-up trailer makes a great place to relax and enjoy some shortwave listening from high in the pines.*

set or two, though, just in case.

If you are using a radio that can be powered from 12 volts, your automobile's "lighter outlet" can make a fine temporary power source for your radio, but beware of power spikes that can be generated when starting and stopping the engine. Don't start your vehicle or shut it down with your radio connected or you could damage the radio. And, always use a fused power cable. Keep in mind automotive engines generate plenty of electrical noise themselves, so your best bet is to listen with the engine off. Just remember – if you listen too long and run down the car battery, you might find yourself stranded!

One of the best and safest solutions for running a 12 volt powered radio is to get one of the popular battery jumper packs. Most of these have the standard lighter outlet on them that will run your radio, and you can recharge the batteries when you get home. And the next time the power goes out back in the city you can still be on the air!

## Some Words to the Wise

Keep in mind when heading into mountain areas, especially at higher altitudes, the weather can change quickly and for the worse. Always dress for the conditions (and take extra clothes for any possible conditions). Take plenty of water and an extra snack or two. This same advice applies to those heading out into the desert or other remote areas. Take a friend along if at all possible and always let someone back home know where you are going and when you expect to return.

Be courteous to those around you when stringing antennas. Don't create any hanging hazards that someone might run into or trip over. Basic antenna storm safety applies here as well. If thunderstorms threaten, disconnect your antenna and seek shelter.

Know and abide by the rules of your public parks and forests, and if you are headed onto private property be sure to have permission of the property

owner.

One more suggestion is to always use earphones or a headset of some sort. Not everyone up camping or picnicking in the wild has your passion for radio signals, so they may not be thrilled with hearing what is coming out of your radio. And, you will hear much better using earphones than you ever could over your radio's speaker. Try comparing a weak signal over the loudspeaker sometime as compared to listening via earphones. You will be amazed and hear things you wouldn't otherwise hear. Once again, you have reduced the noise to hear the signals better.

## Finally

Taking your favorite radio out for a trip into the rural country can be a great way to hear things you have never heard before. It doesn't matter if you are a camping enthusiast or just a day tripper out for a picnic or some tailgating. There is a crispness and cleanness to the signals you just can't hear back in town and the stations seem to boom in.

Plus, it is just plain fun to get out and away while enjoying your radio hobby. It doesn't have to be complicated or require fancy equipment or antennas, nor do you have to be a radio guru. I would venture to say a simple inexpensive setup out in the woods might just outperform an elaborate high-dollar station in the middle of a metropolis! Give it a try and have some fun. Improve your signal to noise ratio. Grab your radio and get outta' town!

## About the Author:

Ron T Parks ([wb5dyg@arrl.net](mailto:wb5dyg@arrl.net)) has been a shortwave listener and amateur radio operator since 1971. He has worked in broadcasting as well as electronics field engineering. Currently Ron works for a local police agency part time as an investigator, providing electronic surveillance support, and full time in marketing communications developing multimedia content and writing.

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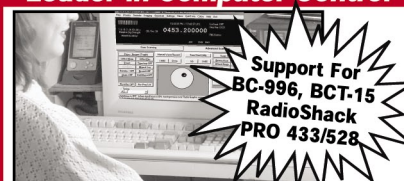
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# Aviation Radio in Labrador - circa 1947

*Excerpts from the 1985 March and April Monitoring Times*

By Bert Huneault

**A**s an 18-year-old whippersnapper fresh out of Marine Radio School in Montreal, I was hired by Canadian Pacific Airlines in the summer of 1947 and assigned to a radio/weather station up in the Labrador bush country for my very first job. Little did I know that I was destined to spend the next two and a half years in isolation in that sub-arctic region of eastern Canada. As a matter of fact, Labrador wasn't even part of Canada back then – Newfoundland and Labrador did not join the Canadian Confederation until 1949.

That first posting was in a log cabin on the shore of Ashuanipi Lake in western Labrador, over 150 miles north of civilization. There I was to fulfill the duties of radio operator and weather observer; our call letters were VOSL. C.P. Airlines had a contract to fly supplies to the remote iron ore mining development at Knob Lake, 150 miles further north; Knob Lake is now the community of Schefferville, on the Quebec-Labrador border.

At first, the only company I had up there was a "bushman" and a dog. I was to look after technical things such as observing and reporting the weather, relaying c.w. traffic and talking to pilots over air/ground radio, while the bushman took care of the chores, such as finding and fetching firewood and cooking meals.

## Our First Emergency

Once winter set in, we were really isolated for a while. Skis replaced pontoons on bush planes, but for the first month of winter the ice was not thick enough to safely support the weight of an aircraft – and no helicopters were available then. Mail was air-dropped to us during that time and it was during that awkward period that we had our first emergency.

One day the gasoline engine which drove our electrical generator quit – What a bind! Not only did we lose electrical power for lights, but we couldn't operate the radio transmitter and couldn't call for help! The bushman and I looked at the engine but couldn't figure out what was wrong with it.

Because the mercury often dipped to 40 below outside, we removed the engine from its foundations, put it on a sled and, with our dog's help, pulled it over to the radio shack where we could work on it in relative comfort. I spent the next couple of days studying the service manual from cover to cover, examining the engine, and trying to figure out why it did not tick!

I finally reached the conclusion (educated guess) that the fuel pump was defective; unfortunately, we had no spare pump. So we just sat there, thinking that someone would eventually come to our rescue. With the absence of weather reports from Ashuanipi the company was bound to start worrying about us sooner or later!

Our HF radio gear included an emergency

battery-operated receiver which was fix-tuned to our company frequency, 5705 kHz. For three days we kept listening from time to time, to see if radio operators at our other company bases were talking about us. They weren't!

Finally, on the fourth day, we heard the pilot of a DC-3 calling us blind, saying; "I hope you can hear this ... we assume you're having some sort of difficulty, as we haven't heard you for several days ... if you need anything, please write it down on the lake. We'll be over your station in a few minutes."

I quickly put on snow shoes and rushed onto the snow covered lake; there walked around, tracing 20 foot long letters in the snow, spelling the message "FUEL PUMP NEEDED." The DC-3 was soon overhead; it circled once or twice while I finished writing the message. As I walked towards the shore I waved my arms to the pilot; he rocked his wings and headed south back to civilization.

The next day the DC-3 was back, flying low over the lake where he dropped the anxiously awaited parcel: a fuel pump, well packed in a mail bag. I retrieved the "present from heaven" and proceeded to install the new fuel pump. We took the engine outside and tried to start it ... to my utter amazement, it worked!

## Four o'Clock Intrigue

In 1948 the mining company started its own airline known as Hollinger Ungava Transport. C.P. Airlines lost its Labrador contract and I transferred over to H.U.T. This new company expanded operations, hired more radio operator/weather observers, and agreed to supply the Canadian Meteorological Service with around-the-clock hourly weather observations from Ashuanipi and Knob Lake.

After a brief weather course in Montreal I was posted to Knob Lake Airport. Over the next two years I alternated between Knob Lake and Ashuanipi, six months per posting.

At Knob Lake, our call letters were VB6T and our new company frequencies were 5715 kHz for air/ground voice communications (AM modulation; we didn't have single sideband back in those days) and 5742.5 kHz for point-to-point c.w. traffic (weather reports, company messages, etc.)

One day, as I was preparing to transmit my 4:00 p.m. weather report to our control station at Seven Islands (Sept Iles, Quebec, on the north shore of the St. Lawrence River), I was surprised to hear a whole network of c.w. stations parked right on our frequency and exchanging ciphered information.

Who were they?... What were they doing?... Where were they located?... I tried contacting them with QRZ DE VB6T QRA?... but to no avail. Their signals were so strong that I had to delay the transmission of the weather report due to the QRM.

After a few minutes, they stopped transmitting and our channel was clear once again.

I didn't hear them again until 4:00 p.m. the next day when, once again, several stations obviously reporting to a net control station took turns transmitting cipher groups that made no sense to us. As I recall they didn't even use call letters! Were they military?... The intrigue continued as they adhered to that 4:00 reporting schedule daily for ten days or more.

A noticeable chirp on their c.w. tones was a tell-tale clue that they were probably using portable equipment with poorly regulated power supplies; hence our conclusion that they were probably Canadian or American troops on field maneuvers.

The only part of their encrypted transmissions that made any sense to us was that as each station in the net completed its report, the operator would transmit in familiar "Shave-and-a-haircut" rhythm: "dit di-di-dit dit," to which the control operator would reply: "dit-dit."

One day I got a break – it was my big chance to break into the net, so I moved fast! One operator had just transmitted his "dit di-di-dit dit" and as soon as I noticed a delay in the reply, I quickly tapped "dit-dit" on my own Morse key, just to see what would happen.

The operator must have been alert enough to notice the lack of a chirp on my c.w. tone because, after a week of trying, I finally succeeded in extracting a response from one of the stations; he simply keyed a cautious "WHO?" in plain English! I replied "VB6T." He came back: "WHERE?" to which I replied, "BUSH, QUEBEC-LABRADOR BORDER." That so-and-so then transmitted: "GOOD PLACE FOR YOU, OM."

Well, that did it! I sent, "YOU ARE INTERFERING WITH US," to which he answered: "YOU, REPEAT YOU ARE INTERFERING WITH US!" I then tapped: "WHO GOT THIS FREQUENCY IN THE FIRST PLACE?" His last transmission was: "WHO DO YOU THINK HAS MORE WEIGHT WITH THE GOVT?" After that, he simply ignored me!

The daily 4:00 p.m. interference continued for a few more days and then stopped, never to be heard again. The intrigue was never solved; to this day, I do not know for sure who they were or what they were doing, but for a week or two they added a little spice to our existence!

## Direct Connection with the Devil?

One afternoon, while I was on duty at Knob Lake Airport, I had switched our powerful low-frequency radiobeacon at the request of one of our pilots. Whenever that big brute of a transmitter was on, the whole radio shack was filled with RF

energy. Everything in the place was “hot”... We’d even draw sparks off the metal tuning knobs and toggle switches on our receivers whenever we touched them! Those were temporary conditions until a permanent transmitter building was constructed.

While I was seated at the operator’s desk, facing away from the door, I became aware that someone had entered the building and closed the door. Not hearing any conversation, I turned around to discover a middle-aged Indian who was sitting on chair beside the door. He had simply come in out of the blue and sat there staring at me and the radio equipment.

A number of these Montagnais Indians used to hunt and trap mink, beaver, and other fur bearing animals in the region, so his presence wasn’t that unusual; but I didn’t know what he wanted in the radio shack.

I said “Hi!” to him but got no reaction. I tried a few more words in English, but got nowhere. So I switched to French, with the same negative results. He didn’t even smile – he just sat there with his arms folded and stared at me. I then tried the few Indian words and expressions I knew; I still wasn’t getting through to him.

I remember saying to myself, “I’m going to get a reaction out of him if it’s the last thing I do!” Electronics came to my rescue.

Sitting on the operator’s desk was a large neon bulb of the same shape and size as a regular 60-watt light bulb. Remembering that the room was full of RF, I took the bulb in my hand, walked over to the Indian who was still sitting by the door, held the bulb right in front of his face, and said: “Look!...Regardez!”

I then walked over to the wall near the transmitter where a hand saw was hanging on a nail, and I knew the blade would be “hot” with RF. I simply touched the base of the neon bulb to the blade of the saw – the bulb glowed with a bright orange color! I looked at our friend.

Success at last! The guy was grinning from ear to ear; he then got up and walked out the door without saying a word. I never saw him again. I wondered if that poor fellow thought I had a direct connection with the devil himself!

## Cherry Red Vacuum Tube Plates

The new transmitter building was safely located about 2500 feet away from the radio operator’s station in a new control tower. The transmitters were remotely controlled by telephone line. The operator I was about to replace drove me to the new site to show me around.

When we walked into the building I saw a huge new transmitter and immediately spotted three large vacuum tubes whose plates were glowing a bright cherry red! Instinctively, I rushed to the transmitter and pushed the red button labeled “OFF.” The operator shouted at me, “What the heck do you think you’re doing? This is our radio beacon, and we’ve got an aircraft coming in!”

He switched the powerful transmitter back on and calmly explained that it was normal for those type-833A tubes to glow red like that. A fan blowing cold air on these three parallel-connected power amplifier tubes prevented them from melting. That was my introduction to kilowatts of RF power!

## Northern Lights Galore

During 1947-49, a new peak in solar activity was recorded. Being in the auroral zone of sub-Arctic Canada during this intense maximum in the 11-year sunspot cycle was an experience not soon to be forgotten. Not only did Mother Nature frequently put on fantastic displays of Northern Lights – awe-inspiring spectacles of colored rays, arches and fast-moving lights in the sky – but those sunspots and solar flares played havoc with shortwave communications.

Sudden ionospheric disturbances often resulted in complete radio blackouts for up to four consecutive days! It was an eerie feeling, tuning across the whole shortwave and broadcast band spectrum and not hearing any signals at all. It was as if the world had come to an end and we were the only ones left! We didn’t mind the disruptions too much; we knew they were only temporary and the spectacular shows in the nighttime skies were well worth the inconvenience.

Because of the frequency of these magnetic storms, our ability to supply the outside world with hourly weather reports was severely hampered. We got around the problem by installing remote keying facilities in our radiobeacon transmitter, and we instructed Seven Islands Radio to listen for our weather reports on our beacon frequency (in the 2 kHz band) during HF radio blackouts. Sure enough, with brute-force RF power, our LF ground wave c.w. signal made it through most of the time – weak and noisy, but readable.

During that time I became very interested in the shortwave propagation forecast charts, tables, maps, and monograms available from the Central Radio Propagation Laboratory the U.S.A. The CRPL operated time and frequency standards radio station WWV which was then located in Washington, DC.

In return for their generous offer of technical literature and monthly forecast charts, the CRPL people asked me to supply them with weekly reception reports of WWV signals from our QTH in the auroral zone. I’ve been a radio wave propagation buff ever since.

## An Ideal Spot for Ham Radio

After over a year in the bush I realized that amateur radio would really come in handy for keeping in touch with the outside world. Since I was already the holder of a commercial operator’s certificate, the Canadian license was granted on request. I became VE2SH in Knob Lake, Quebec; when I operated in Ashuanipi, Labrador, I used the call letters VE2SH/V06.

I built a c.w. transmitter and ordered a Hammarlund HQ-129X receiver through the company. I was soon on the air and had a ball!

My parents lived in Montreal. One evening, on my father’s birthday, I thought I’d surprise my Dad and send him birthday greetings via ham radio. I called “CQ Montreal” for quite a while on 40 meters c.w., but got no answer until a ham operator in St. Hyacinthe, Quebec (a city 35 miles east of Montreal), responded to my call and volunteered to relay my traffic to Montreal on 80 meters.

After giving him the birthday message and my father’s address and phone number, I assumed that within a few minutes my parents’ phone would ring and Dad would get a surprise. Little did I know

that he would not receive the birthday greetings until several days later; and when he did finally get the message it was by mail from Kansas City, Missouri!

It turned out that the band had changed rapidly that evening and the ham operator in St. Hyacinthe could not raise Montreal. He then passed the message to an operator in Kansas City for long-distance relay to Montreal, but that guy got stuck with the message as propagation conditions changed again. So, in desperation, he dropped the message in the mail. Oh, the pleasures of HF radio!

Being in World Zone number 2, I was a very popular fellow at DX contest time! That zone encompassed northern Canada, and there were very few active ham operators up there. I once took part in one of these DX contests and the experience was fantastic. With my V06 callsign I was in unbelievable demand. Dozens of c.w. stations would call me simultaneously. After sorting out a single callsign from the mess, I’d exchange numbers with that ham.

During the brief exchange the frequency would be very quiet, but as soon as I’d end the QSO with di-dah-di-dah-dit, all heck would break loose and I’d be swamped with dozens of calls again! This went on and on... They didn’t let me QRT until well into the night! So found out what it is like to be DX – I’ll never forget that experience!

## Baseball Games on VHF Radio

Come October, our company pilots were all interested in the World Series. The World Series games were broadcast on shortwave by the Armed Forces Radio Service (AFRS), and we could pick up these broadcasts very well on our spare HF receivers. But, when our DC-3 pilots had to fly the usual supply run, each of the three legs was about 150 miles long. During the baseball games, they had no way of hearing the AFRS broadcasts because their HF aircraft receivers did not cover the international shortwave broadcast bands.

By that time we had VHF aircraft band equipment (WWII surplus transceivers) to complement our HF gear. We company radio operators had the idea to relay the World Series games to our pilots via VHF radio by placing our VHF microphones in front of our HF receiver loudspeakers. Our pilots never missed a play during their three-hour flights. From the altitude at which they cruised, as soon as they’d fly out of VHF range from one of our stations, they’d come within range of the next one!

We loved our pilots (they brought us our mail and food!) so we got a big kick out of doing this for them. This procedure wasn’t exactly according to government radio regulations, mind you, but our company planes were the only ones using that VHF frequency in our neck of the wood, so there was no harm done.

So, those are some of the incidents and capers that I remember very well from that bygone era of bush planes and unsophisticated aviation radio. All in all, those two-and-a-half years were quite an experience for me. I learned a lot about radio, aviation, and weather, and all three of these fields have remained hobbies of mine ever since.

I often think back to those “good old days” in Labrador in the late ‘forties. The living conditions may have been primitive, but I didn’t know it then, and I enjoyed every minute of that northern adventure.



## DXing Latin American TV & Radio via Satellite

**O**ne big advantage to digital satellite TV is that there's more room on each satellite than with analog, and transmission costs are low enough to make it economical for smaller countries to distribute their signals nationwide. Because the satellite footprint covers most of the western hemisphere, it also makes it possible for citizens abroad to watch programming from back home. And, it means that the rest of us get to watch, too.

These transmissions are mostly done in the Digital Video Broadcast (DVB) standard, which at this time is done in MPEGII. Most of the signals are transmitted Free-To-Air (FTA), which is to say that they're not encrypted. Anyone with an MPEGII FTA receiver and a C or Ku-band satellite dish can tune in.

### ❖ What You'll Need

The easiest way to tune in is with an old-fashioned big dish satellite system. Dish size and installation depends on what you're trying to do. Generally, the bigger the dish the better. A typical 10-ft mesh dish with an old analog receiver (to drive the dish) and an MPEGII FTA receiver works best. On Panamsat 9 you can get by with a dish as small as 4-ft across, provided it's a good dish such as a solid, spun aluminum dish. In any case, the dish needn't be movable if you just want to watch one particular satellite.

In general, the lower you have to look on the horizon, the harder it will be to "see" the satellites you want to tune in, as trees, buildings and hills will block the signals. You'll really need to be on the East Coast to have any chance of seeing Hispasat 1D at 30° W or NSS806 at 40.5° W. Easier targets will be Panamsat 1 at 45° W and Panamsat 9 at 58°W.

Any MPEGII FTA receiver will be able to tune in the FTA channels, but some are a little easier to use. The most expensive ones are \$500 and include 60 GB removable hard drive recorders, but there are many cheaper ones which will work well. Look for a receiver



*Don't let the \$99 price tag of the Traxis 1500 MPEGII FTA receiver fool you. It stores up to 4,000 channels from 100 satellites in its memory. (Courtesy: Skyvision)*



*This Pansat 6000HXC MPEGII FTA receiver is a top of the line product at \$499.95. It features blind search capability and a built-in 60 GB hard drive for recording. (Courtesy: Skyvision)*

capable of doing a "blind search" (automatically looking for MPEGII FTA signals and entering them into the receiver's memory). Even if you have to manually enter the tuning parameters, all receivers hold the data as entered and you should only have to do it once. If new channels come up, you can go to the web sites listed in the "resources" below and get the parameters for the new channels.

Over the years I've used a dozen or more different MPEGII FTA receivers. The Fortec receivers work well and can do a blind search; Coship receivers work very well; the Globecast World TV receivers work well and have the advantage of a built-in smart card reader which allows you to subscribe to the Globecast channels found on Intelsat America 5.

In used receivers look for ST-9900 and ST-6600 (one of the few DVB receivers with AC3 Dolby audio output), both of which are no longer made. All MPEGII FTA receivers can tune both C and Ku-band signals.

### ❖ What You'll See and Hear

There are many encrypted services on these satellites which you won't be able to watch, but there are plenty more FTA TV and radio channels which make getting started in satellite TV DXing worthwhile. Here's the satellite line-up.

**Hispasat 1C** is Ku-band and most of its transponders are beamed to Europe, but it does have a spot beam to the west on which you'll hear Radio France Internationale, RNE Todo Noticias, Radio Exterior, Radio 1, and Radio Classica (all from Spain). Most of the channels on **Hispasat 1D** (also Ku-band) are beamed to Europe, but there are a few channels spot beamed to North America, notably the feeds from Cuba, which include CubaVision and Canal Habana and the radio services of Radio Habana, CMBF, Radio Rebelde, Radio Reloj, and others. Other feeds on this satellite include TV Libre and



*Aljazeera's new English service to North America is on Panamsat 9. It provides polished news programming from a Mideast perspective.*

TeleCaribe.

**NSS 806** is C-band and carries the national radio and TV feeds for Argentina, Venezuela, Brazil, and Colombia. It's also the location to find TV Marti and VoA TV Latin America, VoA TV Persian and VoA TV feeds, as well as VoA radio including VoA *Music Mix* and VoA *News Now*. The signals are not strong, and a minimum 10-ft dish is needed with a clear view to the southeastern horizon.

**Panamsat 1** is C-band and carries channels from the Dominican Republic, Honduras, Peru and Paraguay with radio stations from Honduras, Peru and Paraguay.

**Intelsat 805** is much easier to receive and includes XHTVL Canal 9 (Villahermosa, Mexico), Zee Networks (South Asian programming), Canal 1 (Ecuador), Canal 1 International (Ecuador), RTP Internacional (Portugal), Canal 3 (Guatemala), Canal 4 and Canal 10 (Nicaragua), Canal 11 (Costa Rica) and several channels in Portuguese from Brazil. Radio services include Guatemala, Costa Rica, and Peru.



*Nicaragua's national channels 10 and 4 are up 24/7 on Panamsat 1. Telenovellas, chat shows, national news and their own version of Judge Judy: Caso Cerrado!*



*CubaVision shows the cultural side of Cuba: music, art, and dance. It's straight propaganda but it's the only source of current video from the island.*

**Panamsat 9** is the easiest to receive and has an intercontinental assortment of programming including Deutsche Welle TV, CCTV 4, CCTV 9, CCTV E&F (China), Arirang TV World (Korea), NHK World TV (Japan), Al Jazeera International (Qatar), and CubaVision. Radio stations on Panamsat 9 include China Radio International, Deutsche Welle Radio 1, 2 and 7, RAI International (Italy), and Radio Italia.

### ❖ Set-up Tips

All of these channels, with the exception of Hispasat, are on C-band satellites. You can't use a small dish for reception. But, it's not hard to find a big dish. There are hundreds of thousands of them in disuse all over the country. Most people will gladly give them to you if you'll just haul

them away. In fact, that's what *MT's* Kevin Carey did last year when he rescued a very nice dish from a neighbor who was glad to be rid of it. Most dishes are complete with heavy duty dish drives and need only a new receiver to control the motor.

If you already have a big dish system and an FTA receiver and are trying to locate these satellites, here are some other tips:

If your dish doesn't go all the way to 1A805, you can adjust the position of the actuator so that it will allow the dish to move farther. If you have an 18-inch actuator, consider buying a 24-in or 36-in actuator. I've used a 36-incher for nearly 20 years of constant movement through the Clarke Belt every day. It's a good investment.

None of these satellites have any analog transmissions, so you'll be channel hunting in the dark. The easiest way to find these digital birds is to run the dish to the easternmost satellite and, using a combination of the MPEGII FTA receiver's search screen and the analog receiver's satellite set-up screen, enter the data for a known channel and polarity on the MPEGII. Now with the analog receiver, move the dish one click at a time to the east. You'll see the signal strength indicator rise as you approach the targeted satellite. Stop at the strongest signal. Now let the FTA receiver do its search.

In many ways, satellite TV DXing is like shortwave listening. It's an opportunity to learn about other cultures and it's a great language building tool. But, even if you don't speak any of these languages, there are many English broadcasts on nearly all the foreign channels. Watching the international satellites opens a

fascinating window on the rest of the world.

## TUNING INTO LATIN AMERICA

### SATELLITES:

Satellites Carrying Latin American Programming Viewable from North America  
*Satellite/ Location/ Notes*

**Hispasat 1C** 30° W Ku-band spot beams to NA. TV & Radio from Spain, France & Argentina.

**Hispasat 1D** 30° W Ku-Band spot beams to NA. Cuban National TV and Radio.

**NSS 806** 40.5° W C-band. Argentine National TV and Radio.

**Panamsat 1** 45° W C-band. Central American National TV networks.

**Intelsat 805** 55.5° W C-band. Mexico, Central America TV & Radio.

**Panamsat 9** 58° W C-band. International TV and Radio feeds from Europe and Asia.

### INFORMATION SOURCES:

Complete C/Ku-band channel worldwide listings are available at [www.lyngsat.com](http://www.lyngsat.com). If you find that site a little confusing, try this site for MPEGII FTA Latin American channels viewable in North America: <http://www.global-cm.net/MPEGlistATL.html>

### EQUIPMENT:

Complete MPEGII FTA satellite systems and/or components are found at the following:

Global Communications [www.global-cm.net/](http://www.global-cm.net/) 608-546-2523

Globecast World TV [www.globecastworldtv.com](http://www.globecastworldtv.com) 888-988-5288

Sadoun Satellite Sales [www.sadoun.com](http://www.sadoun.com) 888-519-9595

Skyvision [www.skyvision.com](http://www.skyvision.com) 800-500-9275

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RX-320D



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**Q.** *If I buy a four-port multicoupler for future scanners and only use two of the ports now, do I need to terminate the unused ports?*

**A.** No, it's not necessary, and ignoring them may actually provide higher signal levels to the two scanners, since terminating resistors would properly match the two unused ports, guaranteeing that half of the signal voltage is dissipated there.

**Q.** *I've heard that running a short-wave receiver with a power source other than household AC can reduce interference significantly; is that true and what sort of power supply should I be looking for? (Stephen Wood, S. Yarmouth, MA)*

**A.** Household appliances generate considerable electrical noise interference which is radiated by the electrical household wiring and picked up by the antenna, so the farther you can get the antenna from the house the better – and always use coaxial transmission line.

However, there is some electrical noise which can be conducted by the receiver's line cord directly into the receiver, and running the receiver from an isolated power source like a battery can help.

If your receiver has a 12 volt power connection, try temporarily connecting a 12 volt battery to the receiver to see if that reduces electrical noise. If so, then yes, a different power supply should help. If you already have a transformer-type power supply, then a line-noise filter may help. Stay away from switching-type power supplies (compact, lightweight) and stay with larger, heavier, transformer power supplies. See if you can test the supply first before buying it (or if you can return it); perhaps you can find one advertised as a low-noise or line-filtered supply.

In the past, I have used an inexpensive, 12 volt, 7 ampere-hour (7 AH) lead-acid storage battery, widely sold for computer UPS backups. I would keep it charged with a 120 VAC/12 VDC wall-wart supply, then simply unplug the wall wart when I wanted to listen to the receiver powered only from the battery.

**Q.** *What is the difference between using the RG-6/U or the RG-8U cable? Which one do you recommend and why? (Mike, email)*

**A.** RG-6/U is outdoor video cable, rated at 72 ohm impedance. It is designed for low-loss, VHF/UHF TV reception; it is much smaller than RG-8/U and is 100% shielded.

RG-8/U is made for heavy-duty, 50 ohm transmission; it is typically 95% shielded. Premium foam-dielectric RG-8/U is also lower loss than the older-style polyethylene insulation. It is considerably more expensive than the RG-6/U, as are the connectors and adaptors. The smaller-diameter RG8/X or RG-8/M (smaller diameter than RG-8/U) works quite well.

The actual line-loss characteristics of the RG-6/U and the RG-8/U are virtually identical. While the impedance is nearly 50% higher in the RG-6/U, the actual signal loss in virtually any antenna installation due to this mismatch is inconsequential.

Our reason for recommending RG-6/U over RG-8/U in all VHF/UHF applications is that it costs less, has a smaller diameter, is more flexible, has the same loss characteristics, works well with solderless (F) connectors and adaptors, is perfectly suitable for transmitting, and is more readily available.

**Q.** *The dB gain for the Super Select-A-Tenna (ANT40 in the Grove catalog) is "up to 40 dB"; what is the gain of the original Select-A-Tenna – the one without the built-in amplifier? (Jim Thornton, email)*

**A.** 0 dB, because it has no amplification. The passive loop is a bigger, better antenna than what's in the radio, so it picks up more signal than the radio gets by itself; the radio now "bathes" itself in that surrounding field of energy and thus picks up stronger signal levels. It is like a tuned, air core, RF transformer, with the Select-A-Tenna loop being the primary winding and the radio's internal loop being the secondary.

**Q.** *Why is it, when I turn off my H800 active antenna and loosen the antenna connection on my receiver so that only the center pin of the coax remains connected, I still get the same signal levels as when I have the connector fully screwed tight and the active antenna turned on? (Robert Morris, email)*

**A.** With only the center pin connected to your receiver's antenna jack, the entire coax line is

acting like a random-wire antenna. You would get the same response if you connected just the outer ring (shield) to the center post of the receiver. However, that random-wire antenna passes nearby accessories and AC lines, inviting electrical noise interference.

With the H800 connected properly, however, the shield of the coax line prevents the intrusion of unwanted, nearby interference signals, and only the two-foot, remotely-located, outdoor whip is doing the pickup.

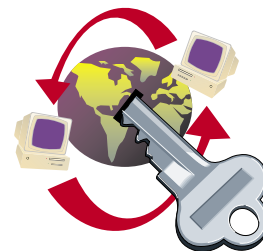
**Q.** *I have an outside TV antenna with a flat-two-wire leading into my attic. I also have a 30dB amplifier with a coaxial input and output that I could mount there. Do I need a resistive coupler between the 300 ohm flat wire and the 75 ohm input of the amplifier? (Mark Kedzierski, Berryville, VA)*

**A.** It's not the resistance, it's the impedance (a complex value consisting of the DC resistance of the wire), as well as the capacitive and inductive reactance of the components. The balun (balanced to unbalanced) transformer is used to match a balanced antenna system (your TV antenna and twin lead) to an unbalanced line (coax). The impedance transformation ratio is typically 4:1 (300:75 ohms).

While this is theoretically best, it's not always mandatory. If the antenna and twin lead are far enough away from electrical interference sources, just go ahead and attach the twin lead to the center pin and screw thread of the preamp connector. If the picture looks good (no ghosting or sparklies), you're home free.

### MT READERS ONLY

To access the restricted website for the month of February, go to [www.monitoringtimes.com](http://www.monitoringtimes.com), click on the key, and when prompted, enter "mtreader" under user name, and your password for February is "fessenden". New material is being added every month.



Questions or tips sent to Ask Bob, c/o MT are printed in this column as space permits. Mail your questions along with a self-addressed stamped envelope in care of MT, or e-mail to [bobgrove@monitoringtimes.com](mailto:bobgrove@monitoringtimes.com). (Please include your name and address.)

**Q.** I have a customer who purchased a BC250 on eBay. She bought a new P25 digital card for it. She wants to listen to the Douglas County Nebraska Motorola P25 system. The DC system uses a 9600 baud control channel and as I remember the BC250 can only do 3600 baud P25 stuff. I've heard that Uniden has a flash upgrade to enable 9600 baud decode if you send them the scanner. Is my recollection correct on the control channel baud rate issue? Have you heard of the flash upgrade? (Rick Brown, Mobile Communications, Inc.)

**A.** The news for your customer is not good. On the older Uniden digital scanners, the card has absolutely nothing to do with what trunk system the scanner will decode. That is a function of the scanner itself. Older units such as the BC250 will only handle a 3600 baud mixed mode system. They cannot handle the newer 9600 baud systems. The only thing the card does is change the digital APCO stream from 1s and 0s to an analog voice. According to Mr. Paul Optiz of Uniden, these older units "cannot" be flashed, so no upgrades can be done to them.

And there is a double whammy for the owners of those radios. Since they cannot be flashed, they will also no longer be usable on analog trunk systems if their area is subject to rebanding.

**Q.** Just wanted to know if there was a review on the BR330T Uniden Radio. I have the 396T receiver and it is an excellent unit, but it doesn't do HF. I am just wondering how this unit works on HF as compared to the Yaesu VR-500, which I use for a handheld for HF. Its sensitivity (VR-500) is great on AM and USB. I also own a couple of Icoms, but they're not as good as the VR-500.

What would you personally recommend for a good handheld, or what do you own, because if something happen to my VR-500, I would be out of luck. (Eric Reynolds, Las Vegas, Nevada)

**A.** This question strikes a real raw nerve with me. You do not get something for nothing. How do you judge the performance of a \$259.95 handheld scanner to another radio covering the same range at ten times the price? There is absolutely a review on the BR-330T, from the December 2005 issue of *MT* when I performed a *First Look* review. It is available at [www.monitoring-times.com/html/mtfirstlook-br330t.pdf](http://www.monitoring-times.com/html/mtfirstlook-br330t.pdf).

But do not look for a favorable review on this unit's HF performance. Quite frankly, it is horrible and not worth the purchase if you are looking for good HF listening. In fact, to be brutally honest, across the board there is not a single wideband HF handheld I would recommend for HF monitoring based on their performance in that band. Here are the reasons why (in general terms):

1. The wider the bandwidth, the worse the sensitivity and dynamic range. These are two significant figures by which we judge radios. They equate to whether you will hear the station or not. In order to improve dynamic range, it takes more circuitry (and, therefore, cost) to increase that dynamic range. There is a reason why WinRadio charges around \$2,000 dollars for a 150 kHz-1.5 GHz receiver (and it isn't just added features boosting that cost). How do you think a \$500 handheld that covers the same range will perform? Admittedly, it doesn't take much of a radio to hear a 500 kilowatt shortwave broadcast transmitter sending the BBC World news out of Antigua. But how sensitive of a receiver do you need to hear my 100 watt ham transceiver in the crowded 20 meter ham band?
2. Antennas are everything. Typically, in the HF spectrum we use horizontal wire antennas that start in the 10-30 foot range and go up in size as the frequency goes down. You can't avoid this fact of basic physics, and there are no shortcuts. The better the antenna, the better the reception. Also, any antenna that is vertical is not good in the HF range. Noise loves receptors that are vertically polarized. How do you think your six inch rubber duck antenna (which is 3dB shy of a dead short anyway) will compare with my 105 foot longwire on HF? Who do you think will hear more?
3. Buying any scanner handheld that has HF reception capability but is AM only (no SSB), and that is like going into battle with only one boot on. Over 75 percent of the HF spectrum covered by your shiny new scanner uses a mode other than AM. If you want to buy a decent shortwave receiver, there are some cheaper ways to do it (such as a Kaito1102 at \$79.95), that will outperform most of these handheld wonders!

So let's boil this down: In general, as you move up in price, you get a better receiver (i.e., more reception). A better receiver has more of what we should judge radios by: sensitivity, selectivity, dynamic range and audio. Lower any of these four criteria and you run the risk of not hearing the stations you want to hear.

HF demands bigger and better antennas to

hear the weak stations. Six-inch rubber ducks and (in most cases) vertically polarized active antennas are not the best choices to yank in the DX on wideband handheld scanners. Ignorance is bliss, so you guys using these little HF radios as your primary HF receiver have to ask yourselves: "How much am I *not* hearing due to my poor performance specs?"

I think the *Passport 2007* said it best at the end of their Icom R20 review: "Radios with broadband frequency coverage simplify engineering, production, shipment, and inventory control – no wonder they keep cropping up. Alas this tantalizing concept keeps falling short except with costly receivers, and the handheld Icom IC-R20 is no exception."

**Q.** Have the Marine channels changed designators recently? I've been hearing CG Station Monterey (in California) using 165.3125 calling it channel 21, but as far as I know channel 21 is on 157.0500. I thought at first maybe it was some odd harmonic but I've monitored both frequencies at the same time using two different radios and they definitely carry different traffic. Any thoughts or ideas on this? Tim Schaffer via email.

**A.** Nothing new, and, no, the designators have not changed. You are hearing a US Coast Guard Law Enforcement/Intelligence net repeater that repeats 157.050 Marine Channel 21 from San Pedro Coast Guard Integrated Support Command in California. There are quite a few of these links or backbone repeaters that the Coast Guard uses around the country. In Maine, they have one on 165.3375 MHz that repeats 156.800 Marine channel 16. Down New Orleans way they have one of these LE/Intel repeaters also on 165.3375 MHz. In fact, I would recommend to anyone along the coast in VHF range of a CG facility to check 165.3375 MHz.

**Q.** I know Stridesberg make a filter that will pass 225 and up. Does anyone make one that will pass ONLY 225-400? Randy True via email.

**A.** I have never seen one. Given the frequency range, it would probably have a very limited market and not be profitable for a company to make or sell.



## Trunking and Talkgroups

**O**ne area of confusion with trunked radio systems is the concept of a talkgroup and what all of those numbers mean. New scanner users can find all of that overwhelming, so this month we explain what those numbers mean and how they represent the conversations you want to hear.

### ❖ Allen, Texas

*I have friends who work for the Allen, Texas, Police Department. I bought the Radio Shack PRO-97 scanner so I could listen to them. I had the guy that programs the scanners give me DEC numbers and HEX numbers like 16112 - 16176 - 16208 - 2640 - 16432 - 16464 for DEC numbers and HEX seem like they are coded like 0a5 and 3f3.*

*When I look on the Internet to find codes, I get 112 and 400 - 9 or 400 - 10.*

*Which ones do I enter and what numbers are entered where?*

*If you could help, or at least tell me my scanner is not a good one, any help would be great.*

*- Gene in Texas*

Allen, Texas, is located in Collin County, just northeast of the Dallas-Fort Worth Metroplex. The town itself is probably most famous to young television viewers, although they probably don't know it - numerous episodes of the television shows *Barney and Friends* and *Wishbone* were filmed there. More important to adults, one of the three major consumer credit reporting agencies, Experian, is located in Allen.

The town of Allen itself has some 70,000 residents, while the county is home to 660,000 people. At least four trunked radio systems are in operation across the county, including a municipal system covering the town of Allen.

### ❖ Talkgroups

In a trunked radio system, conversations are organized by *talkgroups*. Typically these conversations are related to a department (police, fire, medical, etc.) and for a specific purpose (dispatch, car-to-car, investigations, and so on). There may be a talkgroup just for police detectives and another for fire personnel training. The person who sets up the system will organize the users into talkgroups according to the duties and responsibilities of each user. In a system of reasonable size this process could eventually produce hundreds of talkgroups.

Each talkgroup that is established on the system is assigned a unique number. That number is known as a *talkgroup identifier*. Each radio

in the system is programmed with one or more talkgroup identifiers. The specific identifiers in the radio depend on who is going to be using the radio. A radio used by a police officer will have talkgroups related to law enforcement, while a radio for a firefighter will have talkgroups related to fire prevention and suppression. Having a talkgroup identifier programmed into a radio makes that radio a "member" of a talkgroup. Since nearly all modern radios can have more than one talkgroup programmed in, membership in multiple talkgroups is the norm.

When a conversation in a talkgroup is underway, the talkgroup identifier and a radio frequency channel assignment are broadcast to all the members of the talkgroup. Those member radios automatically tune to the assigned radio frequency and begin monitoring the conversation. Your scanner does the same basic operation - it listens for talkgroup/frequency messages, automatically tunes to the assigned frequency, and begins monitoring.

Since talkgroup identifiers are just numbers, they can be represented in several different ways, including decimal and hexadecimal form.

Decimal ("DEC") numbers are the regular base-10 numbers you use every day. Base-10 means that the base used to count is ten, so you have ten possible digits: 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9. The number 462, for instance, has three digits, each of which represents a power of 10. Specifically, 462 equals (4 times 100) plus (6 times 10) plus (2 times 1). The 100, 10, and 1 in this example represent the value associated with each position in the number. All this may seem pretty basic, but it will help in understanding other ways of representing the same number.

Hexadecimal ("HEX") numbers use base-16 to count and have sixteen possible digits. In addition to the digits 0 through 9, hexadecimal also uses the letters "A" through "F" to represent the values 10 through 16:

Digit	Value
A	10
B	11
C	12
D	13
E	14
F	15

The position values in hexadecimal representation are powers of 16 rather than 10. So instead of 1, 10, 100, 1000 and so on, we have 1, 16, 256, 4096, 65536, and so on. For instance, the hexadecimal number 1CE has the value (1 times 256) plus (12 times 16) plus (14 times 1), remembering that C has the value 12 and E has the

value 14. This adds up to 462 (256 + 192 + 14), so hexadecimal value 1CE has the same value as decimal 462.

Why bother to go to all this trouble to represent numbers in hexadecimal form? Because representing information from computers is more convenient in hexadecimal format than decimal format. Since radios in trunked systems have computer chips inside them to exchange information, hexadecimal format is actually quite useful.

At their most fundamental level, computers actually use yet another representation, called *binary*. In binary there are only two digits, 0 and 1. These binary digits, called *bits*, are the fundamental units of information inside computers. The base for binary is 2, so the equivalent values for binary, decimal, and hexadecimal look like this:

Binary	Decimal	Hexadecimal
0000 0	0	
0001 1	1	
0010 2	2	
0011 3	3	
0100 4	4	
0101 5	5	
0110 6	6	
0111 7	7	
1000 8	8	
1001 9	9	
1010 10	A	
1011 11	B	
1100 12	C	
1101 13	D	
1110 14	E	
1111 15	F	

Motorola analog trunked systems, such as those operating in Collin County, use numbers containing 16 bits to represent a talkgroup. Of these sixteen bits, twelve are assigned to the talkgroup identification number and the remaining four, called *status bits*, represent various situations that may exist during a conversation.

One of the status bits indicates whether the transmission is encrypted or not. The remaining three status bits represent whether the transmission is an emergency and if the talkgroup is somehow interconnected to another talkgroup, according to the following table:

Status Bits	Decimal	Meaning
000	0	Normal transmission
001	1	Fleet-wide (a talkgroup for all radios)
010	2	Emergency
011	3	Crosspatch between talkgroups
100	4	Emergency crosspatch
101	5	Emergency multi-select
110	6	Unknown
111	7	Multi-select (initiated by the dispatcher)

For example, a normal message has status bits of 0000 (0 in decimal). If that transmission was encrypted, it would have status bits of 1000 (8 in decimal). An emergency message that is not encrypted has status bits of 0010 (2 in decimal), while an encrypted emergency message would have status bits of 1010 (10 in decimal).

So, now that we have all that background, let's look at how some real talkgroups are listed.

The Allen Police Department uses the Plano trunked radio system. On that system, the talkgroup number 16112 has been reserved for dispatch. If we convert 16112 to hexadecimal, we get the value 3EF0. (Some scientific calculators are able to convert between decimal and hexadecimal. You can also use the calculator that comes with the Microsoft Windows operating system on your PC if you switch it into scientific mode.)

Because each hexadecimal digit is four binary digits, it's very easy to look at the hex value and separate the talkgroup identifier from the status bits. In this case, the talkgroup ID is 3EF (the first 12 bits) and the status bits (the last four bits) are 0. As we've seen, this indicates a normal situation and this is how you'll enter the talkgroup into your scanner.

However, if you're listening to the radio and you see talkgroup 16114 (3EF2) instead of 16112 (3EF0), it means that the Allen Police Department dispatch channel is active with an emergency transmission. Notice that the last hexadecimal digit is now a 2 (meaning "emergency") rather than a 0 ("normal").

Because the status bits are independent of

the talkgroup ID and may change depending on the transmission, they are not included in talkgroup listings. You'll see the first three digits of the hexadecimal number, but the fourth digit will be omitted.

### ❖ Using the RS PRO-97

The PRO-97 is a handheld scanner built by Radio Shack and is perfectly capable of following the activity in your area. The scanner was first introduced in 2005 and can support up to 1000 channels in 10 banks. It can track the "big three" analog trunked radio systems, namely Motorola, EDACS (Enhanced Digital Access Communications System) and LTR (Logic Trunked Radio). The scanner also has a "Signal Stalker" feature, allowing you to locate nearby transmissions without knowing the exact frequency in advance. The severe weather alert features can also be handy in your area, especially during tornado season.

The PRO-97 has a computer interface that allows the downloading of frequencies into the scanner from a personal computer. The proper USB scanner programming cable is available from Radio Shack as part number 20-047. There are also third-party cables available on the Internet. Along with the cable you will need software. Two popular programs for the PRO-97 are Scancat-Lite from Computer Aided Technologies ([www.scancat.com](http://www.scancat.com)) and Win97 from Starrsoft ([www.starrsoft.com](http://www.starrsoft.com)). Both programs make it possible to read data from the scanner, manipulate and store that data on your computer, and write it back to the scanner. This saves an enormous amount of time and key presses to get

all the frequency and talkgroup information into the PRO-97. It also makes it possible to load data files created by other hobbyists and downloaded from the Internet.

If you choose to do things the hard way – meaning you want to enter everything into the scanner manually, then read pages 22 and 23 in the user's guide first, then skip ahead to page 71 and follow the step-by-step programming instructions.

What I would recommend is programming just the frequencies and operating the scanner in "Open" mode, meaning it will stop on any active talkgroup. After a while you will begin to recognize the various talkgroups, including the ones you really want to monitor. At that point you can program in the interesting talkgroups and switch to "Closed" mode, where the scanner will only stop on talkgroups that you've programmed.

### ❖ Collin County, Texas

Collin County operates a Motorola Type II trunked radio system for public safety use. They have four repeater sites, located in McKinney, Farmersville, Celina, and Blue Ridge. Frequencies in use on the system are 860.4625, 866.2250, 866.7250, 867.2250 and 868.1250 MHz.

The Farmersville repeater site also uses 866.0125, 866.5125, 867.0125, 867.5125 and 868.0125 MHz. These five frequencies are mutual aid channels, with the 866.0125 assigned as a "calling channel" and the remainder as tactical channels. They are commonly referred to as NPSAP (National Public Safety Planning

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Advisory Committee) channels and are set aside as analog-only radio channels to allow different organizations to communicate directly with each other during emergencies.

The Collin County trunked radio system has a large number of talkgroups. In the table below I've listed the decimal talkgroup number, the hexadecimal equivalent, and a description of the talkgroup assignment.

Decimal	Hex	Description
16	001	Fire Common 1
48	003	Fire Common 2
144	009	Blue Ridge Fire
176	00B	Branch Fire
208	00D	Fairview Fire
240	00F	Farmersville Fire
304	013	Josephine Fire
336	015	Lavon Fire
368	017	Lowry Crossing Fire
432	01B	Jail Booking Officers
528	021	Minimum Security Jail
560	023	Jail Dispatch
592	025	Courthouse Operations
656	029	Roads and Bridges
784	031	Public Works Streets
848	035	Fire Marshal
880	037	County Fire Investigations
912	039	Fire Dispatch
944	03B	Anna Fire
976	03D	Celina Fire
1008	03F	Weston Fire
1040	041	Prosper Fire
1072	043	Sheriff Dispatch
1104	045	Sheriff Records
1136	047	Sheriff Investigations
1168	049	Sheriff Field Operations
1200	04B	Sheriff Emergency Response Team
1232	04D	Constables
1264	04F	Constables (Warrant Service)
1296	051	Jail Operations
1328	053	Sheriff Police 1
1360	055	Sheriff Police 2
1424	059	Sheriff Narcotics and Vice (encrypted)
1456	05B	Sheriff Negotiator
1616	065	Maintenance
1744	06D	Nevada Fire
1776	06F	Parker Fire
1840	073	Princeton Fire
1872	075	Royse City
1904	077	Westminster Fire
2096	083	Jail Operations
2192	089	Melissa Fire

## ❖ Plano, Texas

The city of Plano, home to a quarter of a million residents, sits in both Collin and Denton Counties and lies about 7 miles south of Allen along U.S. Highway 75. Plano operates a separate Motorola Type II trunked radio for themselves and other local jurisdictions. The system uses the following frequencies: 866.0625, 866.1500, 866.1750, 866.6500, 866.6750, 866.9625, 867.0625, 867.1500, 867.1750, 867.6500, 867.6750, 867.9625, 868.0625, 868.2750 and 868.3000 MHz.

In addition to the five NPSPAC channels described above, all Plano Police and Fire radios have three Incident Control Channels (also called Regional Mutual Aid channels) programmed: 866.5500, 868.0500 and 868.3500 MHz. These channels are intended for short range, direct radio-to-radio communication.

The Plano Police Department has divided the city into four sectors, labeled A through D from east to west. These sectors are typically referred to by their phonetic equivalent, where A sector is called "Adam," B sector is called

"Bravo," C sector is called "Charlie" and D sector is called "David." This phonetic code is basically the American Radio Relay League (ARRL) alphabet from 1948 and is in common use among many police departments in the United States.

The four sectors divide the city into four north-south slices, where each slice covers the city from the northern border at the top to the southern border on the bottom. Adam sector runs from the eastern city limits to Route 75. Baker sector runs from Route 75 to Custer Road. Charlie sector runs from Custer Road to Coit Road. David sector runs from Coit Road to the western city limits.

Talkgroups on the Plano system are almost all small towns and municipalities. I've only included Plano and Allen in this listing, but several other towns use the system.

Decimal	Hex	Description
16	001	Plano Fire Emergency Announcements
48	003	Plano Police Emergency Announcements
80	005	Plano Public Works Announcements
112	007	Plano Parks and Recreation Announcements
144	009	Plano Fire 2
176	00B	Plano Fire Medical
208	00D	Plano Fire Investigations
240	00F	Plano Fireground
272	011	Plano Fire link to Richardson Fire
304	013	Plano Fire link to Frisco Fire
336	015	Plano Fire Training
368	017	Plano Fire Computer Aided Dispatch (CAD)
400	019	Plano Police Supervisors
432	01B	Plano Police Warrants
464	01D	Plano Police Dispatch 1 (Adam and Baker sectors)
496	01F	Plano Police Adam sector talkaround
528	021	Plano Police Baker sector talkaround
560	023	Plano Police Charlie sector talkaround
592	025	Plano Police Operations 1
624	027	Plano Police Operations 2
656	029	Plano Police Operations 3
688	02B	Plano Police Detectives 1
720	02D	Plano Police Records
752	02F	Plano Police Narcotics 1
784	031	Plano Police Narcotics 2
816	033	Plano Police Records Lookup
848	035	Plano Police Jail
880	037	Plano Police Crime Scene
912	039	Plano Police Crime Prevent Unit
976	03D	Plano Police Emergency Response Team 1
1008	03F	Plano Police Emergency Response Team 2
1040	041	Plano Police David sector talkaround
1072	043	Plano Fire Training
1104	045	Plano Fire Administrative
1168	049	Plano City Projects
1200	04B	Plano Public Works Engineering 1
1232	04D	Plano Public Works Engineering 2
1328	053	Plano Recycling
1360	055	Plano Solid Waste Collection
1392	057	Plano Streets
1424	059	Plano Streets Supervisor
1456	05B	Plano Water Utilities
1488	05D	Plano Water Utilities
1520	05F	Plano Utilities Supervisor
1552	061	Plano Water Pump Operations
1584	063	Plano Public Works Administrative
1616	065	Plano Public Works
1648	067	Plano Solid Waste Collection
1680	069	Plano Public Works Managers
1712	06B	Plano Traffic Engineering
1744	06D	Plano Parks and Recreation 1
1776	06F	Plano Parks and Recreation 2
1808	071	Plano Parks Supervisor
1840	073	Plano Citywide Channel

1872	075	Plano Citywide Supervisor
1904	077	Plano Building Inspectors
1936	079	Plano Building Inspectors
1968	07B	Plano City Plant
2000	07D	Plano City Manager
2032	07F	Plano City Building Maintenance
2064	081	Plano City Building Repair
2096	083	Plano Print Shop
2128	085	Plano City Warehouse
2160	087	Plano Health Dept Ch-1
2192	089	Plano Animal Control Ch-1
2224	08B	Plano Animal Control Ch-2
2416	097	Plano Fireground
2512	09D	Plano Equipment Shop
2544	09F	Plano City Building Maintenance
2736	0AB	Plano Police Canine Unit 1
2768	0AD	Plano Police Traffic Unit
2800	0AF	Plano Police link to Plano Fire
2832	0B1	Plano Emergency Operations Center
2864	0B3	Plano Police Negotiators
2992	0BB	Plano Police Neighborhood Officers
3024	0BD	Plano Police Public Safety Officers
3056	0BF	Plano Police link to Plano Fire and Plano Schools
3088	0C1	Plano Police Canine 2
3120	0C3	Plano Civic Center Operations
3152	0C5	Plano Police Events
3184	0C7	Plano Fire Events
3312	0CF	Plano Police Training
3600	0E1	Plano Police Dispatch-2 (Charlie and David Patrol)
3984	0F9	Plano Warning Sirens
4048	0FD	Plano City Events
4080	0FF	Plano Police Operations 4
4112	101	Plano Police Detectives 2
4144	103	Plano Police Detectives 3
16016	3E9	Allen PD Announcements
16048	3EB	Allen Fire Announcements
16080	3ED	Allen Public Works Announcements
16112	3EF	Allen Police Dispatch
16144	3F1	Allen Police NCIC
16176	3F3	Allen Police Operations 1
16208	3F5	Allen Police Operations 2
16240	3F7	Allen Police Operations 3
16272	3F9	Allen Police Detectives
16336	3FD	Allen Police Tactical
16368	3FF	Allen Police Traffic
16400	401	Allen Special Events
16432	403	Allen Fire Dispatch
16464	405	Allen Fire Incident Command
16496	407	Allen Fire Operations 1
16528	409	Allen Fire Operations 2
16560	40B	Allen Fire Operations 3
16592	40D	Allen Public Works
16624	40F	Allen Utility Meters
16656	411	Allen Utilities
16688	413	Allen Streets
16816	41B	Allen Parks 1
16848	41D	Allen Parks 2
16976	425	Allen City Health Department
17040	429	Allen Citywide
17104	42D	Allen Police Canine
17136	42F	Allen Police Dispatch 2
17168	431	Allen Police Narcotics 1
17200	433	Allen Fire Dept. Ch-6 Training 1
17232	435	Allen Fire Dept. Ch-7 Training 2
17264	437	Allen Police/Fire Unified Command
17296	439	Allen Police Events 1
17328	43B	Allen Police/Fire Administrative
17360	43D	Allen Police Jail
17392	43F	Allen Animal Control
17424	441	Allen Police Car-to-Car
17456	443	Allen Police System-wide Tactical
17488	445	Allen Police Detectives 2
17520	447	Allen Police Events 2
17552	449	Allen Police Narcotics 2
17584	44B	Allen Police Tactical 2
20944	51D	Plano School Bus Transportation 1
20976	51F	Plano School Bus Transportation 2
21264	531	Plano Police School Liaison
21328	535	Plano Police Equipment Support
21584	545	Plano School Security

That's all for this month. More information related to scanning and trunked radio is available on my web site at [www.signalharbor.com](http://www.signalharbor.com). I welcome your questions, comments and frequency lists via electronic mail to [danveeneman@monitoringtimes.com](mailto:danveeneman@monitoringtimes.com). Until next time, happy scanning!



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Size: 7.06" Wide x 6.10" Deep x 2.44" High

Frequency Coverage: 25,000-54,000 MHz., 108,000-174,000 MHz., 400,000-512,000 MHz., 806,000-956,000 MHz., 849,0125-868,9950 MHz., 894,0125-956,000 MHz.

The Bearcat BCT8 scanner, licensed by NASCAR, is a superb preprogrammed 800 MHz trunked highway patrol system scanner. Featuring TrunkTracker III, PC Programming, 250 Channels with unique BearTracker warning system to alert you to activity on highway patrol link frequencies. Preprogrammed service searches makes finding interesting active frequencies even easier and include preprogrammed police, fire and emergency medical, news agency, weather, CB band, air band, railroad, marine band and department of transportation service searches. The BCT8 also has preprogrammed highway patrol alert frequencies by state to help you quickly find frequencies likely to be active when you are driving. The BCT8 includes AC adapter, DC power cable, cigarette lighter adapter plug, telescopic antenna, window mount antenna, owner's manual, one year limited Uniden warranty, frequency guide and free mobile mounting bracket. For maximum scanning enjoyment, also order the following optional accessories: External speaker ESP20 with mounting bracket & 10 feet of cable with plug attached \$19.95. Magnetic Mount mobile antenna ANTMMBNC for \$29.95.



### Bearcat® BCD396T Trunk Tracker IV

Suggested list price \$799.95/CEI price \$519.95

APCO 25 9,600 baud compact digital ready handheld TrunkTracker IV scanner featuring Fire Tone Out Paging, Close Call and Dynamically Allocated Channel Memory (up to 6,000 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging. Size: 2.40" Wide x 1.22" Deep x 5.35" High

#### Frequency Coverage:

25,000-512,000 MHz., 764,000-775,9875 MHz., 794,000-823,9875 MHz., 849,0125-868,9765 MHz., 894,0125-956,000 MHz., 1240,000 MHz - 1300,000 MHz.

The handheld BCD396T scanner was designed for National Security/Emergency Preparedness (NS/EP) and homeland security use with new features such as **Fire Tone Out Decoder**. This feature lets you set the BCD396T to alert if your selected two-tone sequential paging tones are received. Ideal for on-call firefighters, emergency response staff and for activating individual scanners used for incident management and population attack warning.

**Close Call Radio Frequency Capture** - Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. Useful for intelligence agencies for use at events where you don't have advance notice or knowledge of the radio communications systems and assets you need to intercept. The BCD396T scanner is designed to track Motorola Type I, Type II, Hybrid, SMARTNET, PRIVACY PLUS, LTR and EDACS analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. **Dynamically Allocated Channel Memory** - The BCD396T scanner's memory is organized so that it more closely matches how radio systems actually work. Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 3,000 channels are typical but **over 6,000 channels are possible** depending on the scanner features used. You can also easily determine how much memory you have used and how much memory you have left. **Preprogrammed Systems** - The BCD396T is preprogrammed with over 400 channels covering police, fire and ambulance operations in the 25 most populated counties in the United States, plus the most popular digital systems. **3 AA NiMH or Alkaline battery operation and Charger** - 3 AA battery operation - The BCD396T includes 3 premium 2,300 mAh Nickel Metal Hydride AA batteries to give you the most economical power option available. You may also operate the BCD396D using 3 AA alkaline batteries. **Unique Data Skip** - Allows your scanner to skip unwanted data transmissions and reduces unwanted birdies. **Memory Backup** - If the battery completely discharges or if power is disconnected, the frequencies programmed in the BCD396T scanner are retained in memory. **Manual Channel Access** - Go directly to any channel. **LCD Back Light** - A blue LCD light remains on when the back light key is pressed. **Autolight** - Automatically turns the blue LCD backlight on when your scanner stops on a transmission. **Battery Save** - In manual mode, the BCD396T automatically reduces its power requirements to extend the battery's charge. **Attenuator** - Reduces the signal strength to help prevent signal overload. The BCD396T also works as a conventional scanner to continuously monitor many radio conversations even though the message is switching frequencies. The BCD396T comes with AC adapter, 3 AA nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, SMA/BNC adapter, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO or ESAS systems. Order on-line at [www.usascan.com](http://www.usascan.com) or call 1-800-USA-SCAN.



### Bearcat® BC246T Trunk Tracker III

Suggested list price \$399.95/CEI price \$214.95

Compact professional handheld TrunkTracker III scanner featuring Close Call and Dynamically Allocated Channel Memory (up to 2,500 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging. Size: 2.72" Wide x 1.26" Deep x 4.6" High

#### Frequency Coverage:

25,000-54,000 MHz., 108,000-174,000 MHz., 216,000-224,9800 MHz., 400,000-512,000 MHz., 806,000-823,9875 MHz., 849,0125-868,9875 MHz., 894,0125-956,000 MHz., 1240,000 MHz - 1300,000 MHz.

The handheld BC246T TrunkTracker scanner has so many features, we recommend you visit our web site at [www.usascan.com](http://www.usascan.com) and download the free owner's manual. Popular features include **Close Call Radio Frequency Capture** - Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. **Dynamically Allocated Channel Memory** - Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 1,600 channels are typical but **over 2,500 channels are possible** depending on the scanner features used. You can also easily determine how much memory is used. **Preprogrammed Service Search (10)** - Makes it easy to find interesting frequencies used by public safety, news media TV broadcast audio, Amateur (ham) radio, CB radio, Family Radio Service, special low power, railroad, aircraft, marine, racing and weather frequencies. **Quick Keys** - allow you to select systems and groups by pressing a single key. **Text Tagging** - Name each system, group, channel, talk group



ID, custom search range, and S.A.M.E. group using 16 characters per name. **Memory Backup** - When power is lost or disconnected, your BC246T retains the frequencies that were programmed in memory. **Unique Data Skip** - Allows the BC246T to skip over unwanted data transmissions and birdies. **Attenuator** - You can set the BC246T attenuator to reduce the input strength of strong signals by about 18 dB. **Duplicate Frequency Alert** - Alerts you if you try to enter a duplicate name or frequency already stored in the scanner. **22 Bands** - with aircraft and 800 MHz. The BC246T comes with AC adapter, 2 AA 1,800 mAh nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. For more fun, order our optional deluxe racing headset part #HF24RS for \$29.95. Order now at [www.usascan.com](http://www.usascan.com) or call 1-800-USA-SCAN.

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Bearcat BCD396T APCO 25 Digital scanner with Fire Tone Out.....	\$519.95
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Bearcat 278CLT 100 channel AM/FM/SAME WX alert scanner.....	\$129.95
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## Utility Band Deadline Approaches

In 1992, a World Administrative Radio Conference (WARC-92) approved changes in the international radio allocations to relieve interference between world-band broadcasters. 690 kilohertz (kHz) of bandwidth were removed from the various radio bands used by utility stations and turned over to broadcasters on a primary basis.

In order to smooth the transition, the conference gave the utilities fifteen years to find new frequencies before the change actually went into effect. Since this period began on April 1, 1992, the deadline was set as midnight on March 31, 2007.

Fifteen years sounds like a very long time. In the real world, it is, but we are talking about international radio, which changes at a notoriously glacial rate. Although entire nations have since come and gone, we still have utilities scrambling to make the necessary adjustments.

The frequencies affected (in kHz) are as follows: 5900-5950, 7300-7350, 9400-9500, 11600-11650, 12050-12100, 13570-13600, 13800-13870, 15600-15800, 17480-17550, and 18900-19020. This is some rather prime electromagnetic real estate, to say the least.

### Trouble at CHU:

CHU is the Canadian standard time and frequency station, operated by that country's National Research Council. It's a well-known fixture on 3330, 7335, and 14670 kHz. Emission is R3E (single sideband, reduced carrier).

Late in 2006, it started broadcasting the following rather ominous announcement in English and French: "On April 1, 2007, CHU needs to stop operating, change frequencies, or re-licence. Contact radio.chu@nrc.gc.ca or mail CHU Canada KIA 0R6."

It seems that CHU is in a familiar situation of having to sell the long term viability of shortwave terrestrial radio to the funding bodies. Money is tight, and closing the station has been discussed before. This is not their favorite option, since surveys indicate that the broadcast is still widely used. However, it is obviously the cheapest.

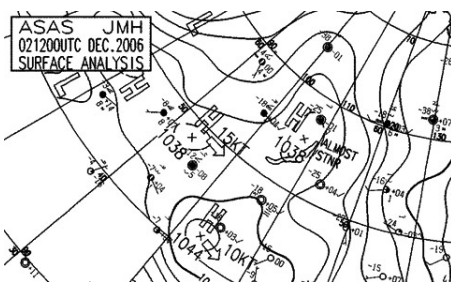
Next cheapest is dropping 7335, though this is by far the most popular CHU frequency. Finally, there are the possibilities of finding another frequency in the 40-meter range, or exploring the feasibility of relicensing the frequency as a broadcast.

It would be too bad to lose CHU, and the

station will try to stay on the air. Those who like it should make their feelings known, and time is of the essence!

### Changing Weather:

JMH is the weather FAX station in Tokyo, Japan. Like CHU, it has had funding issues. A few years back, its closing was pretty much a foregone conclusion, but, again, favorable user feedback convinced the money people to continue operation on three of its former six frequencies. It broadcasts a full schedule of charts and satellite images pretty much around the clock. These are very nice, indeed, coming straight from the Japanese Meteorological Agency.



JMH has announced (in Japanese) that it will be changing frequencies on March 1, 2007, at midnight Japanese Standard Time. Converting this to Coordinated Universal Time (UTC), we get 1500 on February 28. The present frequency of 3622.5 kHz is not affected by the WARC-92 change and stays the same. 7305 goes to 7795 kHz, and 13597 goes to 13988.5 kHz.

Other affected FAX stations are ZKLF, New Zealand, on 9459 kHz; Moscow Meteo, Russia, somewhere around 11611 or 11617; OXT, Denmark, on 13655 and 17510, and VMW, Australia, on 15615.

Since there is already broadcast interference to several of these stations, the changes can't come any too soon. As always, tune weather FAX in upper sideband (USB), 1.9 kHz below the listed frequency. Use drum speed of 120 and index of cooperation of 576.

### US Changes:

The US Federal Communications Commission (FCC) notes with considerable validity that the real crunch is likely to start on March 25, 2007. This is when the summer schedule for world-band broadcasting goes into effect. Since many stations already operate in this spectrum

on a noninterference basis, they are expected to jump the gun by a week and make it easier for everybody. Therefore, FCC is reallocating the WARC-92 bands effective March 25.

FCC stated in its 2005 Report and Order that 249 of its licenses are affected. A quick run through the files indicates that most of these are in the maritime service. They range all the way from the mighty worldwide network of Globe Wireless, down to various mom-and-pop fishing operations. A few frequencies are also licensed to CruiseEmail stations WGM in Florida and WHX in Maryland. Also shown is a Texas oil company.

It is not known if the National Security/Emergency Preparedness (NS/EP) net will be affected. This is one of those USB interoperability nets for many US agencies and companies involved in essential services such as phones and electricity. Several of their frequencies are within the range to be reallocated, but all are near the edges and their status is unknown.

### ❖ The Future

The World Radio Conference of 2003 (WRC-03) adopted a compromise in the 40-meter wars between amateurs and broadcasters. Hams got exclusive use of 7000-7200 kHz worldwide. In return, broadcasters got 7350 to 7400 kHz. This one is effective in March of 2009, at which point it'll be moving day for a few more utilities.

Before any of that happens, there will be another significant radio conference (WRC-07) in October of this year. The ambitious agenda includes a complete review of allocations between 4 to 10 megahertz (MHz). Various working groups are currently churning out thousands of pages of reports, recommendations, surveys, and general contention. Those who like very dry reading can find most of it online.

Originally, this review came out of unfinished WRC-03 business, when it was still argued that broadcasting needed another huge chunk of spectrum. Few people believe that any more. They'll also be looking at digital modes in broadcast and utility, and at the maritime service in general, since the decline of narrowband direct printing and the virtual end of Morse code.

One thing for sure is that things will stay interesting, and rather complicated, with competing interests and countries insisting on exemptions and footnotes. Stay out of trouble until next month.

### ABBREVIATIONS USED IN THIS COLUMN

AFB.....	Air Force Base
ALE.....	Automatic Link Establishment
AM.....	Amplitude Modulation
ARQ.....	Automatic Repeat Request
AWACS.....	Airborne Warning and Control System
CAMSLANT.....	Communication Area Master Station, Atlantic
CAMSPAC.....	Communication Area Master Station, Pacific
COTHEN.....	Customs Over-The-Horizon Enforcement Network
CW.....	On-off keyed "Continuous Wave" Morse telegraphy
DEA.....	US Drug Enforcement Administration
E6.....	"English Man," Russian KGB and successors
E7.....	"English Man," different format than E6
E25.....	Any of 4 "numbers" voices, often Arabic music first
FAX.....	Radiofacsimile
FEC.....	Forward Error Correction
FEMA.....	US Federal Emergency Management Agency
FSK.....	Frequency-Shift Keying
HFDL.....	High-Frequency Data Link
HF-GCS.....	High-Frequency Global Communication System
JSTARS.....	Joint Surveillance Target Attack Radar System
LDOC.....	Long-Distance Operational Control
LORAN-C.....	Long Range Navigation, mode C
M8a.....	Cuban 3-msg CW/MCW, ANDUWRIGHT = 1-0
MARS.....	Military Affiliate Radio System
Meteo.....	Meteorological
MCW.....	Modulated CW or AM tone Morse telegraphy
MFSK16.....	16-tone Multiple Frequency Shift Keying
NDB.....	Non-Directional Beacon
NPHRN.....	US National Public Health Radio Network
PACTOR.....	Packet Teleprinting Over Radio
RSA.....	Republic of South Africa
RTTY.....	Radio Teletype
S11a.....	Slavic "Cherta," always 1st & 3rd Wednesday
Selcal.....	Selective Calling
SHARES.....	Shared Resources (US Government)
SITOR-A.....	Simplex Telex Over Radio, ARQ mode
SITOR-B.....	Simplex Telex Over Radio, FEC mode
Unid.....	Unidentified
US.....	United States
USCG.....	United States Coast Guard
UK.....	United Kingdom
V2a.....	"Atencion" Spanish numbers, 3-msg format
X6.....	Russian intelligence 6-tone "selcal," many variants

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations have their ENIGMA (European Numbers Information Gathering and Monitoring Association) designators in ().

55.5	Unknown-Intelligence center of powerful 200-baud Minimum-Shift Keying, possibly encrypted US Navy, at 0730. (Hugh Stegman-CA)
100.0	Unid-US LORAN-C Station, Middletown, CA, pulsed navigation signal ("9940 chain") with "9th-pulse" data bits, at 0700. (Stegman-CA)
129.1	DCF49-European power grid control, Mainflingen, Germany, identifying in FSK at 1129. (Ary Boender-Netherlands) [New format with station ID on the hour and half-hour. -Hugh]
135.6	HGA22-European power grid control, Lakihegy, Hungary, FSK identifier at 1029. (Boender-Netherlands)
139.0	DCF39-European power grid control, Burg, Germany, FSK identifier at 1059. (Boender-Netherlands)
284.5	DY-MCW identifier of aeronautical NDB, Düsseldorf, Germany, at 0900. (Boender-Netherlands)
290.0	ONL-NDB, Liege, Belgium, MCW at 0901. (Boender-Netherlands)
326.0	LLS-NDB, Lelystad, Holland, MCW at 0945. (Boender-Netherlands)
327.0	MVC-NDB, Merveille, France, MCW at 1002. (Boender-Netherlands)

346.0	WLU-NDB, Luxembourg, MCW at 0920. (Boender-Netherlands)
350.0	LAA-NDB, Laanila, Finland, MCW 0921. (Boender-Netherlands)
355.0	ONW-NDB, Antwerp, Belgium, MCW at 0924. (Boender-Netherlands)
368.5	ELU-NDB, Luxembourg, MCW at 2022. (Boender-Netherlands)
370.0	OHT-NDB, Stockholm / Arlanda Airport, Sweden, MCW at 2021. (Boender-Netherlands)
389.0	MR-NDB, Myra, Norway, MCW at 2002. (Boender-Netherlands)
414.0	SLB-NDB, Solberg, Norway, MCW at 2150. (Boender-Netherlands)
490.0	V-Alger Radio, Algeria, Navtex in French at 1930. (Boender-Netherlands)
518.0	C-ZSC, Capetown Radio, RSA, SITOR-B Navtex at 1220. (Bob Hall-RSA)
3137.0	840001-US Air Force, calling OFF (Offutt AFB, NE), in ALE at 0543. (Mark Cleary-SC)
4041.0	NNNOFKW-US Navy/Marine Corps MARS, net with several other stations at 0030. (Cleary-SC)
4174.0	Unid-Female "numbers" voice in Spanish, at 0307. (Alan Stern-FL) [Old V2a frequency, apparently active again. -Hugh]
4317.9	NMG-US Coast Guard, New Orleans, LA, FAX weather charts at 0124. (Tom Severt-KS)
4372.0	"O-N-B"-US Navy vessel, coordinating Link-11 on 5171 kHz with "5-D-T," at 1643. (Cleary-SC)
4469.0	Florida Cap 1030-US Civil Air Patrol net control, at 0136. (Severt-KS)
4490.0	KFD906-US Department of Agriculture, ALE sounding at 1322. (Jack Metcalfe-KY)
4721.0	544830-US Air Force tanker calling OFF (Offutt AFB, NE), ALE at 1253. (Cleary-SC)
5135.0	SEMOHQ-New York State Emergency Management Office, Albany, working SEMO04, Region 4 headquarters, ALE at 1432. (Metcalfe-KY)
5203.5	"M-9-K"-North Carolina National Guard weekly net control, calling "Tango-6-Golf," other trigraph calls, at 1413. (Metcalfe-KY)
5209.5	NGTROOPCMD-Ohio National Guard Troop Command, Columbus, ALE sounding at 1402. (Metcalfe-KY)
5598.0	Aeromexico 002-Boeing 762, registration XA-OAM, working unknown ground station at 0830. (Patrice Privat-France)
5690.0	Coast Guard 1717-USCG HC-130 on a search, patch via CAMSLANT to Clearwater Air, FL, at 1600. (Cleary-SC)
5696.0	Coast Guard 1717-USCG HC-130, setting guard with CAMSLANT at 2118. CAMSLANT, telling Coast Guard 2114 that the search is over, at 2149. (Cleary-SC) Coast Guard 1501-USCG, securing guard with CAMSLANT at 2329. (Severt-KS)
5708.0	Reach 9947-US Air Force Air Mobility Command tanker, patch via Tanker/Airlift Command Center to McGuire Air Force Base Command Post, at 0935. (Cleary-SC)
5732.0	J33-USCG, ALE to OPB (DEA Operations, Bahamas and Tortugas), then voice as "33C" working Panther (DEA, Bahamas), at 0110. D02-US Customs aircraft, ALE to UCG, voice as Omaha 2MR, working Panther at 0250. J10-USCG helicopter, ALE with LNT, voice telling CAMSLANT that a rescue swimmer is being dropped, at 1223. (Cleary-SC)
5760.0	Russian AM male "numbers" in English (E6), callup 738/141, at 1830. (Mike L-West Sussex, UK)
5778.5	R26602-US Army helicopter, calling B1Z171 (1-171st Aviation), ALE at 1843. (Cleary-SC)
5820.0	KGC253-Possible US General Services Administration, Washington, DC, ALE sounding at 2010. (Metcalfe-KY)
5823.0	2001-Unknown, sounding in ALE on the NPHRN network, also 2204 and 2403, at 2200. (Metcalfe-KY)
6417.5	VTP5-Indian Navy, Visakhapatnam, RTTY test loop at 1521. (Hall-RSA)
6640.0	New York-Aeronautical Radio, Inc. LDOC, patching aircraft



- 6712.0 SkyTour 5671 to SkyTour Ops, at 0350. (Stern-FL)  
COTAM 023-French Air Force distinguished-visitor flight, giving position enroute to De Gaulle airport, at 0909. (Privat-France)
- 6768.0 Cuban Spanish AM "numbers" (V2a), female voice with 5-figure groups at 0402. (Sevart-KS)
- 6788.0 Mallory 85-Indiana National Guard, calling Kokomo at 2230. (Cleary-SC)
- 6855.0 Cuban Spanish AM "numbers" (V2a), in progress under heavy interference from WYFR broadcast, at 2117. (Sevart-KS) [I can't believe V2/M8 won't give up on this frequency. -Hugh]
- 6969.1 NNN0MRQ-US Navy/Marine Corps MARS, automated PAC-TOR-I message system, passing bulletins to NNN0DXB and other stations, at 2213. (Stegman-CA)
- 6982.0 Russian AM male "numbers" in English (E7), callup 199/000, at 1820. (Mike L-UK)
- 6985.0 R24609-US Army helicopter, calling T12 (12th Aviation Battalion), ALE at 2129. (Cleary-SC)
- 7361.5 R24431-US Army helicopter, calling T12 (12th Aviation), ALE at 1246. (Cleary-SC)
- 7527.0 FR4FMA-FEMA Region 4, raised TSC (US Customs) in ALE, then voice with Service Center as WGY 9024, at 1953. J42-USCG helicopter, ALE with LNT, then voice as Juliet 42, telling CAMSLANT they just flew over their building, at 1528. (Cleary-SC)
- 7554.0 Cuban "cut number" Morse Code (M8a), 5-figure groups in CW at 2034. (Sevart-KS)
- 7635.0 Middle East 52-US Civil Air Patrol, VA, opening net at 2204. (Cleary-SC)
- 7831.0 AFA2NF-US Air Force MARS, working AFN2RT in MFSK16, at 1557. (Metcalfe-KY)
- 7887.0 Cuban Spanish AM "numbers" (V2a), in progress at 2033. (Sevart-KS)
- 7975.0 Cuban Spanish AM "numbers" (V2a), callup 65413 07053 66243 and three messages, at 1601. V2a, in progress at 1618. (Sevart-KS)
- 8009.0 Cuban "cut number" CW (M8a), in progress at 2034. (Sevart-KS)
- 8010.0 Cuban Spanish AM "numbers" (V2a), callup 82922 56662 97132, at 1700. (Sevart-KS)
- 8097.0 Cuban "cut number" Morse Code (M8a), MCW callup 68862 61392 03372, at 1800. (Sevart-KS)
- 8136.0 P18OPS-US Army, ALE sounding at 1328. (Metcalfe-KY)
- 8183.0 Russian AM male "numbers" in English (E7), callup 119/000, strong signal at 1800. (Mike L-UK)
- 8301.6 Rescue 05-USCG, passing coordinates of distressed vessel to Sector San Juan, Puerto Rico, at 2156. (Cleary-SC)
- 8463.0 CKN-Canadian Forces, Esquimalt, BC, RTTY Notice to Allied War Ships loop at 1530. (Sevart-KS)
- 8503.9 NMG-USCG, New Orleans, LA, FAX satellite image at 2009. (Sevart-KS)
- 8682.0 NMC-USCG CAMSPAC, Point Reyes, CA, weather FAX at 1540. (Sevart-KS)
- 8788.0 WLO-Shipcom/Mobile Radio, AL, automated voice weather broadcast at 2016. (Sevart-KS)
- 8912.0 T72-US Customs, ALE to EST, voice as Omaha 472 with Hammer (March Air Reserve Base, CA), at 1912. Coast Guard 1711-US Coast Guard HC-130, patch via Service Center to E-City Air (CG Air Station Elizabeth City), on a rescue at 2312. (Cleary-SC)
- 8960.5 Unid-Out of band fishing boat chatter, mentioned vessels *Shiloh* and *Shenandoah*, very strong, and with cleaner language than usual, at 0110. (Stern-FL)
- 8971.0 Passbook 65-US Navy P-3C, passing Spare Group message to Golden Hawk (USN, Brunswick, ME), at 1815. Golden Hawk, telling Passbook 65 they can return to base, at 1920. (Stern-FL) Fighting Tiger 21-US Navy P-3C, calling Golden Hawk, no joy at 2208. Cardfile 71F-US Navy P-3C, calling Fiddle (Jacksonville, FL), no joy at 2216. (Cleary-SC)
- 8983.0 CAMSPAC Point Reyes-USCG, CA, working Commsta Kodiak, AK, at 0015. Rescue 320-USCG CC-130, attempting patch via CAMSLANT to Norfolk Rescue Coordinating Center, at 1501. "D-2-N"-Possible US Coast Guard, chasing a go-fast boat and working CAMSLANT at 1713. (Cleary-SC)
- 8992.0 Long Hand-US military, with a 28-character EAM simulcast on 11175, at 0200. (Jeff Haverlah-TX) Shipwreck-US military, probably "Nightwatch" net, patch via Offutt HF-GCS to a Defense Switched Network number, at 1826. (Cleary-SC)
- 9022.0 Stargate-US Air Force E-8 JSTARS back end, link-16 coordination with Alleycat, at 2334. (Cleary-SC)
- 9132.0 Unknown, newly discovered Polytone or X6-type net of at least two stations broadcasting messages with 12 data tones spaced 40 hertz from 410 to 850, plus one possible signaling tone at 300 Hz, first heard at 0838. (Mike L-UK) [Same Russian people as Polytone? -Hugh]
- 9168.0 Unid-Unknown station relaying FAX from NMG, New Orleans, interrupted by data bursts followed by circuit compressor opening, not an authorized NMG frequency, at 2024. (Sevart-KS)
- 9305.0 USAAAD-US Army, ALE sounding at 1330. (Metcalfe-KY)
- 9450.0 Unknown "numbers" agency (E25), callup 785/19, very loud at 1247. (Mike L-UK)
- 9610.0 Unid-"Numbers" in Slavic language, callup 214/00 (S11a), at 0900. (Mike L-UK)
- 10024.0 Cenamer-Cenamer Radio, Ecuador, South and Central American air route control net, taking position from Tahiti 630 at 0010. (Stern-FL)
- 10100.8 DDK9-Pinneberg Meteo, Germany, RTTY weather for Baltic Sea, at 1801. (Hall-RSA)
- 10242.0 LNT-USCG CAMSLANT, VA, ALE with F31, then working helicopter Foxtrot 31, at 1632. (Cleary-SC)
- 10993.6 Cutter *Tempest*-USCG ship calling Coast Guard 1717, an HC-130, at 1739. (Cleary-SC)
- 11086.7 GYA-UK Royal Navy, Northwood, FAX surface analysis chart at 1805. (Hall-RSA)
- 11175.0 N518QS-Unknown bizjet, a Gulfstream G550, calling MacDill Radio (closed for years), finally raised Puerto Rico HF-GCS, went to 8992 for a check with Lajes HF-GCS, at 2141. [Registration shows nothing special. One of those black-op Gulfstream charters we've heard about? -Hugh] Tuff 13-US Air Force B-52H, patch via Puerto Rico HF-GCS to Base Ops at Barksdale AFB, LA, at 2214. (Cleary-SC) Snoop 56-US Air Force "Rivet Joint" reconnaissance RC-135, passing arrival time in a patch via Offutt HF-GCS, at 2305. (Haverlah-TX)
- 11191.0 Shark 10-Probable USCG cutter, asking Kokomo (US Navy?) if they have comm with Wolf 02 (US Navy E-2C), at 2019. (Cleary-SC)
- 11232.0 Sentry 05-US Air Force E-3 AWACS, patch via Trenton Military to San Diego for Southern California exercise frequencies, given 3040.5 and 4603.0 for link coordination, at 1903. (Cleary-SC)
- 12164.0 8024-Unknown station sounding in ALE on NPHRN, at 2311. (Metcalfe-KY)
- 12224.0 Unid-repeating AM audio tones (possible X6 variant), probably Russian, at 1420. (Mike L-UK)
- 12594.5 VTP-Indian Navy, Visakhapatnam, CW identifier in SITOR-A sync marker at 1800. (Hall-RSA)
- 12965.0 USO-Izmail Radio, Ukraine, RTTY traffic with unknown vessels in Russian and English, at 0830. (Privat-France)
- 13321.0 "08"-Aeronautical Radio, Inc ground station, Johannesburg, RSA, sending an HF DL uplink to ZS-SFE, South African Airways flight 44, an A319, at 1455. 08, HF DL uplink to ZS-SJO, SA588, a Boeing 738, at 1501. (Hall-RSA)
- 13339.0 Unid-AeroMexico Dispatch, company LDOC traffic with flights 198Mexico, 467Mexico, others, at 2320. (Mark Morgan-OH)
- 13510.0 CFH-Canadian Forces, Halifax, NS, FAX surface forecast chart at 1810. (Hall-RSA)
- 13510.0 CFH-Canadian Forces, Halifax, NS, plain text RTTY weather at 1753. (Sevart-KS)
- 13927.1 AFA6PF-US Air Force MARS, patching Sentry 61 (AWACS) to Tinker AFB, at 1805. (Stern-FL) Tuff 13-US Air Force B-52H, patch via MARS AFA4DD to Ops, at 2210. (Cleary-SC)
- 14396.5 KFD905-US Department of Agriculture, DC, checking into some kind of SHARES net with WGY949 (AZ State Emergency Operations Center), WGY920 (ID State EOC), WGY938 (WY State EOC), WKNR977 (Bell Telephone, CA), and WGY918 (FEMA, Denver CO), plus others, all starting at 1641. (Metcalfe-KY)
- 15016.0 Andrews-US Air Force HF-GCS, Andrews AFB, MD, with a long 216-character EAM in a different format than usual, at 1705. (Haverlah-TX)
- 15988.5 DDK7-Pinneberg Meteo, Germany, FAX surface analysis chart at 1140. (Hall-RSA)
- 16014.0 RFQP-French Forces, Djibouti, ARQ marker at 1130. (Hall-RSA)
- 16806.5 NMC-USCG CAMSPAC, Point Reyes, CA, SITOR-B weather and maritime information broadcast at 1733. (Sevart-KS)
- 16812.7 NRV-USCG, Apra, Guam, CW identifier in SITOR-A marker, at 1146. (Hall-RSA)

## Nigerian Oil, Mexican Navy, and Yacht Email

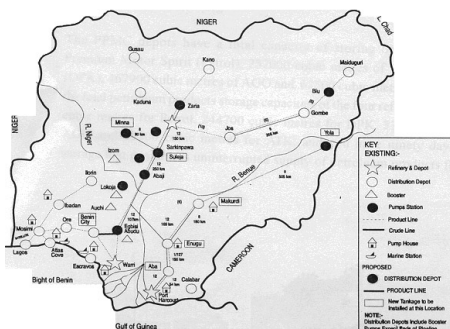
**T**he Thanksgiving break provided some good conditions and a welcome chance to do some concentrated listening. Here are a few things to look for in the digital utility world.

### ❖ Nigerian Oil on ALE

As is so often the case with a prolonged period of monitoring, you find one frequency for a new network, and within a day or two you have a few more. And so it was the case with this newly discovered Automatic Link Establishment (ALE) network from Nigeria.

As with most countries with large oil and gas deposits spread over a considerable distance, Nigeria appears to make use of high frequency (HF) radio and standard MIL-188-141A ALE linking to help keep business flowing smoothly.

The network encompasses a node at most of the pumping stations, terminals and pipelines that connect them, in addition to the main administrative centers of NNPC (the Nigerian National Petroleum Company), as can be seen in the illustration below.



The network operates on at least four frequencies, surprisingly closely spaced, but doubtless there are more to be found. Those uncovered thus far include 6757, 7654, 7759, 7772, and 7949 kHz USB. Most of the traffic is comprised of each node sounding, but there are occasional link quality checks (LQA), so far only seen initiated by the unidentified station "OMQC" which could be a control station for the Ore-Mosimi pipeline. Voice activity has been heard on a number channels after linking, though it is not 100% clear that the voices are associated with the ALE network itself.

Here are the nodes identified thus far:

ABUJA	Abuja HQ
ACOVE	Atlas Cove Marine Terminal
AUCHI	Booster/Distribution Depot
BENIN	Benin City Depot
ESCRAVOS	Escravos Marine Terminal

GUSAU	Gusau Distribution Depot
ILORIN	Ilorin Distribution Depot
JOS	Jos Pipeline/Distribution Depot
KANO	Kano Distribution Depot
KADUNA	Kaduna Depot
LOKOJA	Lokoja Booster/Pump
MOSIMI	Mosimi Depot
OMQC	Unidentified Control Center (probably Ore-Mosimi Pipeline)
ORE	Ore Depot
SARKINPA	Sarkinpawa Pumping Station
SULEJA	Suleja Pumping Station
WARRI	Warri Refinery
YOLA	Yola Pumping Station

During the winter, the network has provided good but not very strong signals into the Eastern US from dusk, fading into the noise again at around 2am EST.

### ❖ Mexican Navy

In the same way that it seems as though you tend to find your most-desired station quite by accident, it seems as though we've been bumping into the Mexican Navy with increasing frequency recently. The Mexicans are heavy users of the Israeli-made Tadiran radio equipment, which affords its users some security in that the ALE and voice encryption schemes are not yet decodable by us hobbyists.

You may remember that Tadiran does most of its propagation checking, link quality, data messaging, and ALE through a proprietary and quite distinctive 2 or 4 tone 125bd FSK signal. (Check the Resources section for an audio clip.) Once you hear it, I guarantee that you'll begin steadily to notice it everywhere!

Sit patiently on many of the frequencies on which you can hear Tadiran and, many times, you'll find that traffic often switches to the familiar MIL-188-110A high-speed modem. Much of Mexican Navy's routine modem traffic is also in the clear, helping to pinpoint the various bases and ships in their substantial fleet. 18305 kHz USB is one such frequency, and during most of the US daytime, this carries some good traffic.

Here is an example of part of a message captured on this frequency.

~~~~~  
ARMADA DE MEXICO  
RADIOGRAMA  
  
NUM. 1 MEXICO, D. F., a 19 de Noviembre del 2006.  
CK75 FHD191600 UTC IPR\*\*\*  
Ordinario  
Accion Informacion  
ARE 01 OTOMI PO 161 OAXACA RN-1 RN-2 RN-3 RN-4  
RN-6

SEGESCAT PRIESCAMA ESCAVNAV ZN-3 ZN-4 ZN-5  
ZN-6 ZN-10  
PO 144 ROMERO PI 1124 ALNILAM NAVCOAT NAVPAZ  
NAVCHIS  
PO 151 DURANGO ^ ^ ^ ^

Note the characteristic lead-in and lead-out to the message, in this case ^^^^, a feature that is associated with most 110A modem traffic and can often be used to distinguish one user from another.

### ❖ Yacht Email Continues to Develop

Barely a day seems to go by without coming across a new frequency with PacTOR (packet teleprinting over radio) activity that turns out to be another email/Internet gateway service for yachts at sea. There are now at least half a dozen on these organizations – most are private clubs – providing these services, some with very extensive worldwide multi-frequency coverage for as little as \$250/year.

The latest stations appearing with these organizations are:

SailMail's 9Z4DH from Chaguaramas in Trinidad:  
2212, 5005, 7405, 10150, 13548, 17103, 18172 and 20528 kHz

SailMail's HPPM1/2 from Chiriqui in Panama:  
4071.5, 5731.5, 8181.5, 10446.5, 13876.5, 18436.5 and 23046.5 kHz

SailMail's CEV773 from Los Logos, Chile:  
2828.5, 5266.5, 10620.0, 10623.0, 13861.5 and 13875.0 kHz

CruiseEmail's J3A692 from St. Georges in Grenada:  
2248, 4439.50, 4440.90, 4626.90, 6859.90, 6772.40, 6771 and 6858.50 kHz

Some traffic is sent in regular PacTOR and can be copied with a variety of decoders. Much of the PacTOR-II traffic is also in the clear and can be decoded with a number of the higher end decoders but PacTOR-III remains out of the reach of most of us. If you're not equipped with any of these decoders, stay on frequency until the transmission ends, as most of these stations will send a Morse (CW) identification before closing down the link.

Of course, it's always possible to buy an off-the-shelf PacTOR unit, but that's quite an investment for a few yachts swanning around the Caribbean!

Well, I'm off to put the radios in the new yacht. I'll see you on the waves perhaps? Enjoy your digital DX.



## Radio Canada (Inter?)National Remakes Itself

The changes reported in our last two columns were only the beginning. Without warning to listeners, on Nov. 27, RCI dumped all remaining CBC relays on SW, and drastically reduced English output toward the USA. The morning transmission at 1400-1700 UT on 9515, 13655 and 17820, which still brought us *Vinyl Café*, *Quirks & Quarks* on Saturdays; and the afternoon 2100-2300 on 15180, which included *Cross Country Checkup* on Sundays, were gone, and no more *World at Six* or *As It Happens* weeknights either, all replaced by one frequency at a time all the way from 1205 to 0405 UT.

Now only a few of those 16 hours are in English, as RCI decided to broadcast not only in French, but in Arabic, Mandarin, Russian, Spanish, and even Ukrainian and Portuguese to the USA!

Earlier tests on 7310 turned into regular usage of this new band from Sackville, at 1205-1405 in Arabic and Spanish. Then 9610 runs from 1405 to 2105, 6100 at 2105-2400, 9755 at 0005-0405. These are nominally targeted at NE USA, except 9755 to Central USA.

English hours containing *The Links* on weekdays, *Blink* or *Maple Leaf Mailbag* on weekends, are just: 1505-1605, 1705-1905, 0005-0205 (Sun/Mon -0105).

Why the 5-minute offset? This programming originates with the RCI+ service on Sirius 188, which apparently requires the delay in order to maintain its priority.

At about the same time, Robb Wise in Tasmania pointed out, RCI abolished live streaming; no more RCI 1, 2 or 3 with convenient repeat times for RCI and CBC programming. Instead, diehard CBC fans are referred to an on-demand service called *Viva*, which drew many listener complaints. No more listening to CBC on SW in bed or at the breakfast table before firing up the computer. Then Kevin Kelly found one RCI stream with the delayed SW version, 5 minutes after Sirius.

Rich Cuff says: "This seems consistent with the change in RCI's mandate. Since the goal is to reach current and prospective immigrants, the radio schedule is rejiggered to reach prospective Arabic-speaking immigrants, for example, who currently live within earshot of the North-American targeted SW broadcasts. One wonders if this change was conceived in haste. It's unlike them to waste money on printing and mailing a schedule when they know changes are coming."

John Figloizzi: "We are witnessing RCI attempting to find a new *raison d'être*, centering on new immigrants, actual and potential. I'm not at all certain that this is a winning formula. Perhaps we are seeing RCI (at least as we have come to know it over the decades) in its final

hours? Do they have any research that recently arrived immigration candidates come with SW radios at the ready? Or is their plan to hand one to each as they come off the plane or apply at the embassy in their country of origin?"

A "sad former listener," Will Martin in St. Louis, called for RCI staff to strike until this "destruction of RCI programming" is reversed. But the RCI Action Committee website remained un-updated since 2005.

Staff at RCI weren't free to speak about what has really been going on; not discussed on the *Mailbag* and no replies to our direct inquiries, only this release from Audience Relations: "SW frequencies for the Americas were changed to cover our intended targets, and the retransmission of CBC and Radio-Canada programming was moved from shortwave to our website, as our domestic services are widely distributed by other means in North America, including Sirius Satellite Radio."

Ricky Leong in Calgary: "If you read between the lines, cities in the Quebec City-Windsor corridor have become part of the 'intended targets' and the northeast U.S. is now simply a spillover zone."

It could be that RCI was faced with the choice of making these drastic changes, or going out of business.

Sheldon Harvey, Montreal, who used to be a regular guest on RCI: "Inquiries about what is happening should be directed at the following three people: Sylvain Lafrance, CBC/Radio-Canada's Executive Vice-President, French Services; RCI's Executive Director Jean Larin; Audrey Schelling, Project Leader, RCI – Radio Communications, [audrey\\_schelling@radio-canada.ca](mailto:audrey_schelling@radio-canada.ca)

"Comments regarding recent developments at RCI sent to the above mentioned people should also be sent to the following Canadian Government Cabinet Ministers:

Minister of Canadian Heritage, The Honorable Beverley J. Oda, [Oda.B@parl.gc.ca](mailto:Oda.B@parl.gc.ca)

Minister of Citizenship and Immigration, The Honorable Monte Solberg, [Solberg.M@parl.gc.ca](mailto:Solberg.M@parl.gc.ca)

Minister of Foreign Affairs, The Honorable Peter Gordon MacKay, [Mackay.P@parl.gc.ca](mailto:Mackay.P@parl.gc.ca)

"It appears, at least in my opinion, that what RCI management is currently doing with RCI programming, services and target areas is, basically, a change to the mandate of RCI. The changes seem to me to contravene the current mandate. Therefore it is necessary that these government ministers know what RCI listeners are saying as I doubt that comments received by the RCI people will actually make it back to the Ministers."

### B06 SCHEDULES from S. AOKI:

[www.geocities.jp/binewsjp/bib06.txt](http://www.geocities.jp/binewsjp/bib06.txt)

**ALGERIA** [non] R. Algerienne, (Holy Kor'an Service in Arabic) via VT Communications, B-06 as in HFCC, via Woofferton, Rampisham, resp.:

0400-0500 6125, 6090  
0500-0600 6025, 6090  
1900-2000 9825, 11815  
2000-2100 9455, 11815  
2100-2300 6055, 9850

(Tony Rogers, UK, *DX Listening Digest*) Often problems with audio feeds

(José Miguel Romero, Spain, *ibid.*)

**AUSTRALIA** Two shipping containers are on the docks at the Port of Darwin, containing HCJB's new curtain antenna and towers. Erection of these is not planned until late 2007 (HCJB News via Australian DX News)

**BELARUS** R. Belarus English at 2020 on 7420 was strong, but the announcers talk way too fast for an enjoyable listening experience. Someone needs to tell them to slow down. Programming was standard old-

school propaganda and lots of fawning over Russia, similar to being forced to listen to a girl talking endlessly about how great her no-good boyfriend is! (Tim Bucknall, England, DXLD)

**BULGARIA** R. Bulgaria moved English to Europe to higher frequencies from Jan. 1: 0730-0800 11900, 1830-1900 and 2200-2300 7400, 9400. Also, R. Varna, Sun 2200-0400 Mon on 7200 ex-7600 (DX Mix News)

**CHINA** Firedrake appeared on new 9200, in late Nov, often but not always heard in the 1400 UT hour, also at 1952, 2029. Could mean new frequency for Sound of Hope (gh) Yes, 9200 is SOH ex-17310 // 13970. Another program on 10400 // 14500 (S. Aoki, Japan, DXLD) Nothing heard on 9200 during the 1200-1205 jamming break. At 1045 Firedrake on five frequencies normally used by SOH: 17330, 14500, 13970, 10400 and 9200. I have a feeling the jamming operators are adding some extra hours just to be sure they are not letting anything

through even when they cannot hear it. Jammers on 17330 and 13970 were synchronous, as were 14500 and 9200. 10400 was different from the others, and propagation characteristics indicate this one located in the far south, like Dongfang (Olle Alm, Sweden, DXLD)

**CROATIA** [non] Voice of Croatia, 7285 via Germany, Germany and Germany, at 0310 in English discussing new translation of Shakespeare. Signal

All times UTC; All frequencies kHz; \* before hr = sign on, \* after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; B-06=winter season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated

had a 'hollow' reverb sound, because three transmitters at two sites were not precisely synchronized, but pretty close. English starts at 0300 (gh, *World Of Radio*) English daily at 2315-2330 and 0300-0315 on 7285; 0700-0703 on 9470, 11690 (Dragan Lekic, Serbia, DXLD)

**CUBA** Radio Habana Cuba's new 6180 in English at 0100-0700 was late starting, but when it did, was bad news for R. Educación, México on 6185; and collided directly with Brazil's 250 kW Amazon service which causes considerable interference even in NAM. Ignoring a 250 kW transmitter in the same hemisphere is not a sign of astute frequency management. Why does RHC need this plus 6060 and 6000, all in English on the same band at the same time? It's crowded enough already. 6060 and 6180 also put a new mixing product on 6300 (gh)

RHC heard again at night on 11705, on AM, not SSB, as it was years ago (Bob Thomas, CT, DXLD) Not included on their belated B-06 schedule, but also heard at 2216 in Spanish (gh) And 2311 in Portuguese (Célio Romais, *Panorama*)

[and non] Well after B-06 began, R. República via UK at 0000-0400 daily left its two hamband frequencies 7205 and 7110, though it was not immediately apparent as jamming from Cuba continued. But then Radio Reloj was reported by several listeners on new 6185 from 0000 past 0200, blasting away R. Educación, México. And Yimber Gaviria in Colombia heard RR on 6100 at 0300-0400, but when we checked, and for several nights in a row in early Dec, the jamming was inexplicably instead against Planet Rock, a UK digital station, with distorted audio, identified by Stephen Howie. VTC/Merlin had another mix-up at master control in London. Finally, RR resumed on 6100 during that hour. The previous 6135 continued at 2200-2400, sometimes with no jamming audible (gh)

R. Martí was in no hurry to publish an updated schedule, either, but was heard on some different frequencies, such as 11750 at 1500, 17660 at 1600, 9515 at 2300, and 5890 alternating with 5980 at 0700. Could be they decided to try the "floating transmitter" tactic against jamming, showing up on unannounced and unexpected frequencies, and forcing Cuba to spread out its extensive jamming resources (gh)

**ECUADOR** Don't you believe that HCJB no longer broadcasts in English. Quite by chance I ran across *Spotlight*, the special-English-teaching quarter-hour, twice in a row on two different frequencies: UT Tue 0315 on 9745, and the same seemingly secular episode repeated at 0330 on 6050. May be on nightly at 0330 if not 0315. Program site is [www.radio.english.net](http://www.radio.english.net) with out-of-date schedules on this and other affiliates (gh, *World Of Radio*)

**GABON** Africa Numéro Un, 9580, was audible almost every day on second harmonic 19160, as early as 1330 and as late as 2240. Then both frequencies developed a loud buzz, obscuring any French audio or music which went with it. This went on for weeks in Nov and Dec (gh) Same buzz on RTVG 4777 from \*0500 (Raúl Saavedra, Costa Rica, DXLD) I've also noted the buzz on 4777 between 1600-1700 when R. Gabon is on. So possibly 4777 is transmitted via ANU facilities. Don't know if buzz is generated by transmitter or is an audio feed circuit problem. On 9580, at 1559 buzz went off slowly, just like someone turning the "fade the buzz" knob. No break in carrier or audio noticed. The next hour, 9580 audio was clean. At 1600 same buzz popped up on 4777. At 1657, transmitter on 4777 was switched off. At 1658 buzz slowly raised on 9580. No break in carrier or audio noted. After some seconds the audio was buried by the buzz. So R. Gabon, ANO, buzz, 4777 and 9580 are connected (Jari Savolainen, Finland, DXLD) And 19160 (gh)

It seems there are three transmitters at Moyabi, used for ANU, R. Gabon, NHK relays and jamming. The one which buzzes is sometimes on 9580/19160, other times on 4777 (Thorsten Hallmann, Germany, DXLD)

**GREECE** VOG has resumed carrying four hours of foreign languages at 0600-1000 (John Babbis, MD, DXLD) Only on 15630, including English at 0700-0800 (Jean-Michel Aubier, France, *ibid.*) Relaying the Radio Filia service carried locally on 666 kHz (Mike Barraclough, *World DX Club Contact*) Thank to Erik Køie, Denmark, for a recording of the opening; said this was for Eu and NAM, even though 15630 is inaudible here, and they would join BBCWS on the half-hour (gh)

**INDONESIA** RRI Manado, Sulawesi, reactivated on 3215v in late November, heard on 3214.84 at 1101-1436\*; next day 3215.16, Jakarta news relay at 1200-1224. Third day ID "Pro satu RRI Manado" at sign-off 1504 with NA (S. Hasegawa, and A. Ishida, NDXC) had been off since March 2002 (Anker Petersen, DSWCI DX Window) Also in early Dec at 2125 on 3215.1, music and talk (Leif Råhäll, Sweden, *SW Bulletin*)

RRI Nabire, Papua, also reactivated on 6125.3 (last check in Oct. 1998 on 6127) heard at 0815-1400\*. Local news 1000-1012, Jakarta news at 1100, 1200 and 1300. First noted by S. Kiyota at 0900 as unID (A. Ishida & S. Hasegawa, NDXC-HQ) Tuned in at 1240 to long talk until 1320, then several nice music selections. Love Ambon at 1358 with closing by female. Pulled plug just after 1400. Certainly running more than the 500 watts now (Steve Lare, MI, DXLD)

V. of Indonesia continued in Nov and Dec running hummy open carrier 1400-1532, then gamelan music loop and English IDs on 9525 - they could have been playing back the entire English program hour at 1400 or 1500 when reception has been quite good, and we have urged them to do so (gh, OK) English heard on 9525 from 2008 tune-in to 2101, SIO 434 but deteriorated by sign-off (Mickey Delmage, Alberta, Log Periodic, DXLD) Or as late at 2105\*, surprisingly good signal (Brian Alexander, PA, *ibid.*)

**IRAN** [non] Radio Democracy Shorayee in Persian, new from Nov. 21: 1700-1800 on 7435 via Russia or CIS transmitter to ME, Tue/Thu/Fri/Sun but co-channel YFR in Russian via Tashkent (DX Mix News, Bulgaria) \*1701 with opening music, and ID (Kouji Hashimoto, Japan, *Japan Premium*) In Persian, but many references to "Radio Democracy Shorayee" (José Miguel Romero, Spain, DXLD) What does Shorayee mean? Council (gh) Got a nice personal email confir-

mation from this new Iranian exile broadcaster. Website, only in Farsi, [www.radioshora.org](http://www.radioshora.org) shows email address: [info@radioshora.org](mailto:info@radioshora.org) (Björn Fransson, Gotland, DXLD) Audio typical of Issoudun, France, or Samara, Russia; very weak under YFR. Closed at 1758 with communist hymn "The Internationale" sung in Farsi (Wolfgang Büschel, Germany, BCDX)

**ITALY** Rumors about a total suppression of SW broadcasts from Italy are stronger than ever. It's highly likely RAI's SW facilities will be switched off for good at year's end. RAI will be producing two international TV channels, instead (Andy Lawendel blog, late Nov)

**LIBYA** [and non] LJB, Voice of Africa in Arabic again via transmitter in Sabrata (near Tripoli), 0800-1155 on 15415, 500 kW, 130 degrees to CAF, some days 0600/0700-1155, and on 15235, 500 kW, 260 degrees to WAF (DX Mix News, Bulgaria) Libya's own SW transmitters had not been heard for years (gh) Audio quality is very good - much better than when I heard the last Sabrata transmitter in operation. So, is this a relay or has the Colonel invested in something new? (Noel R. Green, England, DXLD) 15415 is stronger here than 15235. I'm not sure that France would propagate on 15 MHz as well as these two do at 0735. After 1200, don't find same transmission on other frequencies (Noel R. Green, BC-DX)

Just in the last year, Thomson sold two TSW2500 transmitters to Libya, see [www.tdp.info/liby.html](http://www.tdp.info/liby.html) (Kai Ludwig, DXLD) 15235 and 15415 have news in foreign languages including English at 1138-1158 (DX Mix News, Bulgaria) Or in the final 20 minutes until 1205\*. Numerous other transmissions, relayed via Issoudun, France, continue, including English 1400-1558 on 17725, 21695 (Tony Rogers, BDXC-UK Communication) With big hums, sometimes nothing but hum (gh)

Other English news summaries, approx. times: 1740 and 1823 on 7215; 1920, 2050, 2120 on 7205; 2223, 2358 on 7320 (Dave Kenny, Tony Rogers, BDXC-UK Communication)

**MALAYSIA** SW for domestic broadcasting lives, in Sarawak. RTM will install two SW transmitters in Bukit Kayu Malam (Sarikei) and Bukit Sengalang (Sibu) (Bernama news agency via [kimandrewelliott.com](mailto:kimandrewelliott.com)) Sibu uses 6050 now; Sarikei would be new (gh)

**MÉXICO** Why was Radio Mexico International terminated? Making expenditures is not necessarily a bad thing, but if a project is going nowhere, it's a scandal, an extravagance. RMI was a SW project which functioned with seven transmitters, five of which were ailing. To rehabilitate them would have cost 60 megapesos, while the entire "redimensioning" [of IMER] cost 120. The proportion was brutal; we would have needed 60 additional megapesos, to arrive at who knows what because no one listens to SW.

We are part of a federal government project; who uses SW any more in the federal government? Radio Educación has one which works very well, and Radio UNAM. Thus it seemed to me better to assist them, instead of developing my own project, for which I did not have the resources nor a plan, because I never knew exactly what RMI was for, so the Laplanders could listen to us? Or what was the reason for broadcasting abroad, where people listen to radio by internet? We cancelled the project and sent the transmitters to Radio UNAM (Dolores Béistegui, IMER, interviewed by Laura Islas Reyes and Luis Miguel Carriedo for [www.etcetera.com.mx](http://www.etcetera.com.mx) via Roberto E. Gómez Morales, DXLD)

And R. UNAM, XEYU finally tested that ex-XERMX transmitter for six days in early December, during the daytime on 9599.4 variable. Modulation improved as time went on, but it was too weak here, and subject to hets from 9600.0 stations until 1500 when an ID as R. Universidad Nacional was heard. Thanks to tip from Julián Santiago Díez de Bonilla, DF, who heard from the engineer it was running perhaps 4 kW. What's next? 9600 may be clearest at 1800-2000, but before 1300 and after 0000 watch out for Cuba (gh, OK)

**MOLDOVA** As suggested last month, DMR Radio Pridnestrovye, a megawatt on 6235, was tentatively among the signals heard at local noon, 1700 UT in late November by Dave Valko at a quiet rural location in Pennsylvania (via HCDX) On the air M-F only in English (gh) Also heard at 1701 on 6245, clandestine R. Zamaneh, from Ukraine to Iran (Valko, HCDX)

**MOROCCO** RTM B-06 in Arabic, 250 kW:

0900-1500 15340 Nador 110 deg NAF  
1100-1500 15335 Tangier 027 deg WEu  
1500-2200 15345 Nador 110 deg NAF  
2200-2400 7135 Tangier 027 deg WEu  
0000-0500 5980 Tangier 083 deg EAF  
(DX Mix News, Bulgaria)

**PAPUA NEW GUINEA** The 100 kW NBC transmitter on 4890 has been reported missing by several monitors, including Guy Atkins, Jalisco; Alex Vranes, WV; Craig Edwards, Northern Territory; Wayne Bastow, NSW in checks before 1200 (gh) But was heard in mid-Nov with news in English at 2205 (Dan Olsson, Sweden, *SW Bulletin*) In late Nov these were active around 1000: 3220, 3260, 3275, 3315, 3335, 3365, 3385 and 3905 (Wayne Bastow, NSW, DXLD)

21 megakina has been allocated to rehabilitate all NBC provincial stations (Freddy Gimgai, *The National*, PNG newspaper)

Wantok Radio Light, 7120, finally heard in late Nov after a year of trying, 1057-1128 with Christian music, ID, devotionals (Alex Vranes, WV, NASWA Flashsheet) Also heard between 1205 and 1256 when China comes on frequency (Hans Östnell, Norway and Leif Råhäll, Sweden, *SW Bulletin*)

**PERÚ** There are two stations now near 4790; R. Visión, Chiclayo, on 4790.13, heard with a continuous religious service including chanting from 0111 past 0345, and no ID until 0331. On another night at the same time, 0328-0435, on 4790.00 was R. Atlántida, Iquitos, with very different programming, Andean music, IDs (Mark Taylor, WI, DXLD) R. Visión, 4790.14, also with church service at 1044-1120, no sign of Atlántida (Chuck Bolland, FL, *ibid.*) PWBR '2007' shows only R. Atlántida, even though R. Visión was first reported last May (gh)

La Voz de los Andes, San Miguel de El Faique, Huancabamba, 5602.56,



at 0112 very animated announcer, ID, beautiful OA flute music, suddenly went off at 0119:30\* (Dave Valko, PA, HCDX)

**PHILIPPINES** R. Pilipinas, English at 0200-0330 on 15115 but announced as 15155; also good on 15230, not good on 12030 (Manikant Lodaya, VU2JRO, South India, DXLD)

**ROMANIA** RRI announced on DX Mailbag they will install in the near future one or more new more powerful SW transmitters (Dragan Lekic, Serbia, DXLD)

**RUSSIA** Based on your monitoring, we changed VOR in English to NAm via Vladivostok from 15425 to 7255 at 0415-0600 (Anatoly Titov, Chief of the division for SW and MW Broadcasting Schedules of the General Radio Frequency Centre, to George Poppin, CA, DXLD)

Radio Station Pacific Ocean in Russian, Vladivostok, 250 kW, B-06: 0935-1000 5960, 50 degrees and 7330, 30 degrees (DX Mix News, Bulgaria) Chimes IS, IDs for Radiostantsiya Tikhoy Okean, usual news in Russian, some ballads. 5960 always stronger than 7330. Sent very nice new QSL card (Ron Howard, CA, DXLD)

**SÃO TOMÉ** Charles Lewis, manager of the IBB/VOA relay station is retiring in February and moving to the mountains of northwestern North Carolina. He has also been a very active ham with 100,000 QSOs, his most recent call 595S; online log at <http://s50u.s50e.si> (KB8NW/OPDX/BARF80 via Dave Raycroft, ODXA)

**SLOVAKIA** In an interview with the RSI German-language reporter, the Minister of Culture, Mr Marek Madaric assured listeners that "sufficient funds would also be provided to keep Radio Slovakia going during 2007"; hope this will also involve foreign language transmissions (Alex Röse, BDXC-UK Communication)

Audio files in Spanish were not being updated because the remaining staff was overworked with too many tasks to accomplish each week. Due to the stress, they were being required to take psychological tests (José Miguel Romero, Spain, DXLD)

**SUDAN** R. Peace, Narus, 4750, at 0330-0334 including three IDs in English, guitar music into vernacular program, hymn to piano music, barely audible (Charles Hendry, Bucks., BDXC-UK Communication)

[non] Nairobi-based Sudan Radio Service announced schedule:

0300-0500 M-F 7280

0500-0600 M-F 9525

0600-0630 Fri 15215

1400-1500 Wed 9565

1500-1600 dly 9840

1600-1700 M-F 9840

1700-1800 M-F 9840 (or 9565?)

Programs are in English, Easy Arabic and vernaculars. SRS is funded by the US Education Development Center with support from US AID. It announces that it is "dedicated to peace and development in Sudan." Address is Sudan Radio Service, c/o EDC, P O Box 4392, 00100 Nairobi, Kenya (Alan Pennington, Edwin Southwell, England, Dec BDXC-UK Communication) 9840 reportedly via Moscow; the others? (gh)

Radio Nile (New Sudanese Council of Churches), not heard in B-06 though in HFCC for Madagascar at 0400-0457 on 12060 and 13725 (Dave Kenny, UK, DXLD) Off the air; stopped broadcasting several weeks before end of A06, apparently due to financial difficulties. HFCC registration made before we knew it would not be broadcasting. Whether this is a temporary or permanent isn't clear (Andy Sennitt, Radio Netherlands, *ibid.*)

**SWEDEN** [and non] R. Sweden complains of interference from Iran on 6065. "In violation of international custom, Radio Tehran has begun using the frequency we have used to more than 60 years." (Radio Sweden website via kiman-drewellioff.com) Same QRM (manmade interference) on 6065 as every winter season for at least five years. R. Sweden could easily avoid, and move down to 5820-5860 range. Never solved that problem in previous HFCC registration conventions. What did they talk to each other about at the Athens five star luxury hotel buffet? (Wolfgang Büschel, DXLD)

**TUNISIA** RTT, Arabic on 7190, UT Sat 0629, with a stand-up act, frequently interrupted by audience laughter, something you don't hear much on Islamic-world stations, come to think of it. 0631 into a funny song, 0632 phone interview. Apparently some kind of humor program. Would be nice to know its title and more about it from some of our Arabic-speakers. Sfax is a good reliable signal around this time, 500 kW aimed 265 degrees, while // 7275 at 340 degrees goes off earlier (gh)

**UKRAINE** Re last month, a clarification on the reported home service via Brovary 5970: now one test transmission was made on October 27. If financing appears, then 5970 will start operation (Alexandr Yegorov, RU, via Mauro Ritola via Olle Alm via Kai Ludwig, DXLD) Seems Brovary transmitters are out of regular service since autumn 2002, when the current, dramatically reduced transmission arrangement for RUI came into force (Ludwig, *ibid.*)

**UK** [non] BBC World Service began announcing a week before, that from Nov 20, due to QRM on 9660 [Polonia via Guiana French at 22-23; see last month], they would move to 9480 at 21-23. This includes the mailbag Over to You Sundays at 2241, also on 5975, Guiana French (Wells Perkins, NJ, DXLD)

In mid-Nov I am hearing on 5955 at 1800-2000 a very strong signal in Hebrew, some French and English, relay of TV audio by mistake? (Dave Kenny, UK, DXLD) Moosbrunn, Austria, is supposed to be relaying V. of Vietnam during those hours (gh) Also heard since Oct 29, not every day (Jean-Michel Aubier, France, *ibid.*) Must be a satellite feed mixup. There seems to be no one monitoring what they actually transmit :- (Jari Savolainen, Finland, *ibid.*) One day they had English features on Broadway Musicals, Beethoven, and Bonaire (Mike Barraclough, *ibid.*)

VoV and IBA TV Channel 33 are on different subcarriers of the RRSAT frequency on HotBird 8. They must be tuning in the wrong subcarrier (Doni Rosenzweig, World Of Radio) Transponder 75 on 12.207 GHz horizontal: TV audio of IBA Channel 33 is on 1058, Voice of Vietnam on 1059 (Kai Ludwig, Germany, *ibid.*) I contacted Moosbrunn manager about this and the next day VOV was back, including French at 1830. I guess all Merlin / VT brokered transmissions are fed via Bush House London Merlin/VT control room (Wolfgang Büschel, DXLD) Correct, so presumably the wrong audio channel had been picked up for at least two weeks there (Kai Ludwig, Germany, *ibid.*) See also CUBA [non]

**USA** Kim Elliott made a rare appearance on VOA's *Talk to America* Nov 22, 2006, discussing international broadcasting. Should be available in the audio archive for that date at [www.voanews.com/english/NewsAnalysis/TTA-New-Past-Shows.cfm](http://www.voanews.com/english/NewsAnalysis/TTA-New-Past-Shows.cfm) (gh)

KSL Salt Lake auxiliary on 26190 NBFM (see last month) is KOH-710 as QSLed by KSL CE WA7UUJ, 60 watts (Terry L Krueger, FL, DXLD)

KTML, Lebanon, OR (see last month) transmitter site is not a promising location for HF, in the midst of moderate hills typical of the Willamette Valley, not a uniform flat basin like the California Central Valley, but with a number of ranges of modest hills up to 500 or 1000 ft. or so. Good locations for vineyards and Christmas tree farms, and sometimes gypso loggers, but not ideal for HF transmission. Some flat areas nearby the alleged location, but none exhibiting any sign of three rhombics or a log periodic. Even more telling for something supposed to operate four 50 kW transmitters, no three phase power within a couple of miles. Another vision that may have become delusion? (Ben Dawson, WA, DXLD)

KAIJ (see last month) switched from 9340 to 9480 at 1300-2100, 5755 at 2300-1300. KAIJ is now operating from a new state-of-the-art studio, new automation system but overseen by live personnel, 100 kW. Antenna aimed NW is putting good signals into As, Pac, Au/NZ; move off 9340 was prompted by an interference complaint from an Australian utility. Slogan is now "The New KAIJ, broadcasting from the Big D, Dallas, Texas, USA." Programming is brokered religion and political talkshows; on weekends mostly Pastor Pete Peters. Check [www.worldofradio.com/radioskd.html](http://www.worldofradio.com/radioskd.html) to see if and when World Of Radio has been added (gh)

As of early Dec, WRMI's frequently-changing schedule included *World Of Radio*: Sat 1330 7385, Sat 2230 9955, Sun 0900 9955. *Wavescan*, Sat 1430 7385, Sun 0930 9955; *DX Partyline*, Sat 1130 9955, 1545 7385, Sun 0500 9955. *Viva Miami* sometimes appears Sun 2330 9955 or Mon 0500 9955 instead of *El Sonido de Miami* or *Global Crisis Watch*.

WRMI's number one exile client, *Radio República* was running on 9955: Daily 0600-0800, 1600-2200; M-F 1100-1300, 2200-0200 Tu-Sa, Tu-Sa 0400-0500, Sun/Mon 0300-0500. See also CUBA [non] (gh)

As if a dozen transmitters in Okeechobee, and more and more relays abroad are not enough, Family Radio has bought five hours a day on WINB, more opportunities to hear Harold Camping & Co., 9265 at 12-13 and 00-02, 13570 at 13-15; two hours are in Spanish, at 12 and 00. At 1430, 13570 was running 17 seconds ahead of WYFR itself on 13695, but with inferior audio and signal. WINB's own webpage gave wrong frequency, 9625 instead of 9265 (gh)

WBCQ has another enjoyable show besides *Marion's Attic* playing old 78s, called *Behaviour Night*, Fridays 2200-2300 on 7415, kind of a mix between Marion and Uncle Ed, as the website says (gh)

WRCY, Mount Vernon, IN, heard on second harmonic 3180 at 0315-0330 with good strength and clean audio; licensed for 35 watts non-directional at night on 1590, where unheard (David Hodgson, TN, *harmonics* yg)

**WESTERN SAHARA** [non] Radio Nacional de la República Árabe Saharaui Democrática from Dec 9 on new 6215 ex-7425, at 2200 in Arabic, 2300-2400\* Spanish (Stig Hartvig Nielsen & Bjarke Vestesen, Römö camp, Denmark, *SW Bulletin*) National Radio of the SADR confirmed from 1700 on new 6215, and // MW 1550 at 1900 (Dave Kenny, BDXC-UK) 6215 also heard at 0750-0830, too close to pirate Mystery Radio on 6220 (Luca Botto Fiora, Italy, *playdx* yg) Presumably from Tindouf, Algeria (gh)

**ZAMBIA** R. Zambia, ZNBC, 5915, \*0241-0305+ sign-on with distinctive Fish Eagle IS, 0250 choral NA, 0252 vernacular talk, local choral music. Weak, poor in noise. Also heard a very weak Fish Eagle IS on 6165 at 0241-0250 under a strong R. Nederland but nothing else (Brian Alexander, PA, DXLD)

**ZIMBABWE** From late Nov, at 1939-2010 lively African station mentioning Zimbabwe on 3396 (Björn Fransson, Gotland, Sweden, DXLD) ZBC not logged on 3396 since 1996, but now still on at 2315 (Roberto Scaglione, Sicily, *ibid.*) and past 2400, vernacular, phone-ins, tunes, Radio 1 of "R. Zimbabwe" ID at midnight; very good audio quality in the middle of the utility QRM (Carlos Gonçalves, Portugal, *ibid.*) Reactivated 3396 heard from 2258 to 0210, ZBC, Gweru, Afropop (Anker Petersen, Denmark, *playdx* yg) 0317-0401+, peaked 0330-0340 and a tad better in USB. Nothing on 3306 or 6612 (Harold Frodge, MI, *MARE Tipsheet*) 1830 with R. Zimbabwe net in local language (Jari Savolainen, Finland, DXLD)

This reactivation may have something to do with imminent launch of new service 247 Shortwave. Transmitters have been sitting in Gweru for the last two years, and now they've named someone to run it (Andy Sennitt, Netherlands, *ibid.*)

Also at 1810 noted a different kind of jamming against SW R. Africa on 4880. Earlier, only hum/buzz type weak jamming and SWRA was nicely readable. But now a strong music box or bagpipe type of jamming overriding SWRA (Jari Savolainen, Finland, DXLD)

Until the Next, Best of DX and 73 de Glenn!

# BROADCAST LOGS

NOTEWORTHY LOGS FROM OUR READERS

Gayle Van Horn, W4GVH

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http://mt-shortwave.blogspot.com

## 0025 UTC on 4850

INDIA: All India Radio-Kohima. Vernacular announcements to female's newscast. AIR stations monitored: **AIR-Bangalore** 9425, 0030-0040; **AIR Shillong** 4970, 0030+; **AIR Jeypore** 5040, 0034+; **AIR-Lucknow** 4880, 0040+. (Arnaldo Slaen, Buenos Aires, Argentina) **AIR-Bangalore** 9425, 2030-2036+. Hindi (presumed) English sign-on with AIR identification and national news to 2035 into local language, SIO 4+44-. (Harold Frodge, Midland, MI) **AIR-Bangalore** 11620, 2049 with ID, news and vocal music; **AIR-Aligarh** 15020, 1027 // **AIR-Delhi** 17510. (Ziacharias Liangas, Thessaloniki, Greece/HCDX) **AIR-Panaji** (Goa) 9819.98, 1403-1440. (John Wilkins, Wheat Ridge, CO)

## 0057 UTC on 9620

THAILAND: Voice of America relay. Conversation in Special English about the Internet, followed by station identification. Interference noted from REE Spain during 0059\*. Noted on 9715, 0055 with segment on traditional forms of Chinese art. Audible 15285, 0123 English football updates. (Stewart MacKenzie WDX6AA, Huntington Beach, CA)

## 0058 UTC on 5800

BULGARIA: Radio Bulgaria. Interval signal and English ID, "This is Radio Bulgaria." Newscast in presumed Bulgarian with fair signal on this and // 5900 kHz. (Joe Wood, Greenback, TN)

## 0100 UTC on 7230

SLOVAKIA: Radio Slovakia Int'l. *Slovakia Today* program with Pete Miller and Catalina; 7230 at 0100. (Kraig Krist, Manassas, VA)

## 0245 UTC on 6115

ALBANIA: Radio Tirana. "This is Radio Tirana with the news," followed by segment on Albania with interference from Channel Africa. (Krist, VA) Radio Canada's Albanian relay 9570, 0106 // 9580 via Cuba. (MacKenzie, CA)

## 0310 UTC on 7390

SOUTH AFRICA: Channel Africa. Fair signal improving to lady announcer's station identification. Segments on natural healers in Africa and panel discussion on adopting children from Malawi. Station sign-off at 0400. (Ken Backer, Milton, Ontario, Canada) Channel Africa 15235, 1719-1732 with national news. (Frodge, MI) **Radio Okapi** 11890, \*1500-1559\* French talk and occasional music. (Wilkins, CO)

## 0318 UTC on 3275

PIRATES: The Crystal Ship. Interesting to find this one on 3275 kHz with music from the Eagles, Nazareth and Meat Loaf. Additional pirates: **WBNY** 6925 USB, 2101-2106\* including ID as "WBNY Rabbit Radio." Noted as a special broadcast from "Rodent Revolutions Headquarters" and off with "Peter Cottontail." **Northwoods Radio** 6925 USB, 2224-2251. Announcer Jack Pine Savage with parody music. (Wood, TN)

## 0414 UTC on 3291

GUYANA: Voice of Guyana. English service including BBC relay news on US forces in Iraq. BBC identifications and schedules amid fair signal quality. (Wood, TN) Noted on frequency 0732 with BBC World Service ID to "This is the Voice of Guyana, it's five-o'clock." SIO 353. (Krist, VA) 3291, 0400-0410 newscast to lady's ID with fading and SINPO 24222. (Jim Evans, Germantown, TN)

## 0425 UTC on 3279

ECUADOR: La Voz Del Napo. Announcer's Spanish announcements to listeners' call-in segment amid poor signal quality. (Wood, TN) Ecuador's **Radio Quito** 4919, 2350-2355 with chat and frequency "Radio Quito" ID with SINPO 44333. (Evans, TN)

## 0636 UTC on 7275

NIGERIA: Radio Nigeria. Afro pop music to announcer's local language. English segment on population growth and farming methods in Nigeria. (Wood, TN) **Voice of Nigeria** 15120, 1713-1718 with program notes into *Business News* and ID. (Frodge, MI)

## 0652 UTC on 9580

GABON: Afrique Numero Un. French newscast covering headlines from Senegal and Gabon. (Wood, TN) **Radio Japan** via

**Gabon** relay 15355, 1722-1742. Segment on Japanese street musicians. SIO 3+54. (Frodge, MI)

## 0725 UTC on 11750

AUSTRALIA: HCJB Australia. "This is HCJB World Radio Melbourne Australia." Announcer's opening comments including frequency/meter band quote at 0730. *This is Jesus and Plain Talk* programs. SIO 353 to 0930\*. (Krist, VA) **Radio Australia** 9870, 0040 interviews and talk about Australia; 17795, 0000; 15230// 17785, 2358; (MacKenzie, CA)

## 0804 UTC on 9800

MONACO: Trans World Radio. *Insight for Living* and *Word of Life* programs, to closing, "That brings us to the end of today's broadcast" and abruptly left the air. (Krist, VA)

## 1324 UTC on 3344.76

INDONESIA: RRI-Ternate (presumed). Vocal music to lady's Bahasa Indonesian after each selection. Signal peak at 1345 with slow deterioration afterwards. If this was Ternate, they have reverted to their off-frequency habits or are near 3345 kHz. Noted on 3344.84, 1342-1404 with same language and 3344.76 a few days later. **RRI-Serui** 4604.95, 1412-1500\*. Charlie Rich music and no announcement until 1429 for a brief announcement from male announcer and return to music at 1412, Recheck at 1500 with strains of *Love Amdon*. Nice signal hanging in there while others had faded out. **RRI-Manado** 3215.09, 1257-1420 with Indo music, fair signal and no ID noted. **RRI-Pontianak** 3976.07, 1400-1425 with ARO interference observed. (Wilkins, CO)

## 1346 UTC on 5770

MYANMAR: Defence Forces BC. Presumed this station with vocal music to 1351, then female announcer. Music somewhat readable, but not the announcer. Audible 5985.83, 1356-1426. Children's choir with singing/reciting to announcer at 1403, followed by Burmese vocal music to 1426. Prior to 1426 signal had been pretty good. (Wilkins, CO) 5985.83, 1230-1248. (Evans, TN)

## 1838 UTC on 11775

ANGUILLA: University Network. Teachings from the late Dr. Gene Scott...how long can they keep this up? SIO 444 // 11870 via **Costa Rica**, SIO 2+33 // 13749.9 via Costa Rica, // 13845 via **WWCR** SIO 3+43+. (Frodge, MI) via Costa Rica 9725 at 0420. (MacKenzie, CA) With years of Doc's audio library archived, I predict he'll be preaching the airways for decades. GVH

## 1904 UTC on 11510

ARMENIA: Voice of Russia relay. Male/female with Russian news items with bumper music between items. *From Russia to the World* with a tough copy SIO 1+32 amid buzz interference. (Frodge, MI)

## 2305 UTC on 5910

COLOMBIA: La Voz de tu Conciencia. Spanish and English religious music to Spanish identification at 2318. SIO 333, LSB mode assists signal quality // 6009.5 with SIO 2+33. Variety of Latin tunes, fanfare and anthem at 2256. (Frodge, MI)

## 2318 UTC on 15720

NEW ZEALAND: Radio NZ Int'l. Interview on multi-cultures in New Zealand, audible to 2345. Recheck for news at 2350. (MacKenzie, CA)

## 2335 UTC on 4790.16

PERU: Radio Vision. Spanish. Religious programming with SINPO 24432. Peruvians monitored: **Radio Paucartambo** 6520.40 at 2340, Spanish/Quecha. ID into Peruvian huyanos. **Radio Comercial Huancabamba** 6536, 2345+; **Radio Emisora Bolivar** 5460, 2350+. (Slaen, ARG) **Radio Cultural Amauta** (presumed) 4955, 2355-0010. No ID observed during talk and slow music program. (Evans, TN)

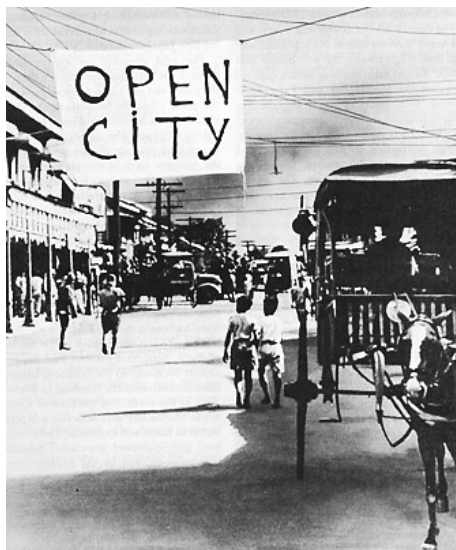
*Thanks to our contributors – Have you sent in YOUR logs?  
Send to Gayle Van Horn, c/o Monitoring Times  
English broadcast unless otherwise noted.*



## Sounds Historical

**W**hile sitting here one day, thinking about possible topics for this column, I had a brainstorm. (Well, okay; it was a mild shower, but still....)

I was listening to a recent edition of *Echoes of a Century*. At present this program is on a handful of smallish stations in the US, basically flying under the radar. I met the host, Daavid Mackenzie, a few years ago via a yahoo group I moderate, and I have become a regular listener. I had downloaded a recent program, which consisted of audio clips from December 7-8, 1941, with reports on the situation from Manila, Honolulu, and Seattle. It was fascinating to hear "as-it-happened" audio from that "day of infamy."



Manila in 1941

You see, I am a history geek. I admit it. I've always been fascinated by history. I grew up listening to the stories of veterans of world wars and Korea, survivors of the Great Depression, tales of the road from my musician father, and I am surrounded by historic sites, from War of 1812 battle sites, to the ruins of early Welland Canals, snaking their way up the Niagara Escarpment a few blocks from my home. And, of course, any time I can combine my interests in history and radio is a bonus.

Listening to Daavid's program and imagining myself listening to those events live, I started to wonder just how many historical programs were out there, and was rather surprised to learn that there were so many. This month I present a quick survey of history programming around the world.

### AUSTRALIA:

**Verbatim** is heard on UTC Saturdays at 1035. "Through the oral histories and memory of individuals, *Verbatim* seeks to illuminate the ways in which Australian society has changed over the past 100 years. Programs reach back to the first decades of the century." [www.radioaustralia.net.au/guide/208.htm](http://www.radioaustralia.net.au/guide/208.htm)

**Hindsight** is a social history program, heard UTC Thursdays at 1400. "The programme offers new perspectives on well-known aspects of the past and brings to light those stories long-ignored on the public record. *Hindsight* takes the memories of ordinary Australians and weaves them into complex, credible and satisfying documentaries." [www.radioaustralia.net.au/guide/292.htm](http://www.radioaustralia.net.au/guide/292.htm)

### BULGARIA:

Radio Bulgaria broadcasts **History Club** on Thursday at 2200 UTC and Friday at 0000 UTC and 0300 UTC, following the news. In addition there is an extensive (and fascinating) archive of history items at: [www.bnr.bg/RadioBulgaria/Emission\\_English/Theme\\_History\\_And\\_Religion/default.htm](http://www.bnr.bg/RadioBulgaria/Emission_English/Theme_History_And_Religion/default.htm)

### CZECH REPUBLIC:

**Czechs in History** is a program which presents people and events in the history of the Czech Lands. It can be heard on the first Wednesday of the month during Radio Prague English broadcasts. As with all Radio Prague programs, this is archived for some time back, with audio and text available on the website.



### KOREA, SOUTH:

**Shaping Korea**, hosted by So-yeon Kim, is heard on Mondays via RKI. "Our weekly history show has emerged as one of the most popular shows on KBS WORLD Radio, il-

lustrating many key moments from the 5,000 years of Korea's national history. From the origin of the Korean people, to the foundation of a modern nation following the Korean war, this 15-minute Monday feature will satisfy your curiosities on how the nation has evolved and why Koreans live the way they do."

**Shaping Korea** can be heard in the final 15 minutes of Monday broadcasts. It's best heard in North America via Sackville at 0245 and 1245 UTC. It can also be heard on demand via their website. In fact the last 8 episodes are available there.

[http://rki.kbs.co.kr/english/program/program\\_click.htm](http://rki.kbs.co.kr/english/program/program_click.htm)

### NEW ZEALAND:

**Sounds Historical** – This program provided the inspiration for the title of this month's column. From the program's website:

"*Sounds Historical* with Jim Sullivan is the programme that gives listeners their chance to learn about the colourful, dramatic, and often remarkable events and people of New Zealand's past.

"Programme material comes from Nga Taonga Korero (Sound Archives) from Jim's own research and from the many listeners who contribute their own memories and stories.

"Jim Sullivan revitalises the past to entertain the present and preserve it for the future." The program is heard on UTC Sundays at 0800 on 9765 kHz and in streaming audio via the RNZI website.

"Jim covers so much, much of it is New Zealand of course but he ventures out to cover stories all over the world, all with a NZ connection. I love history anyway, and I love NZ. I listen to their regular network and concert music too." (Brian Smith)

### ROMANIA:

**Pro Memoria** is a weekly program during Monday English broadcasts of Radio Romania International (UTC Tuesdays during transmissions to North America). It looks like it could be an interesting program. There is an extensive list of transcripts of past programs on the website, but there are two obstacles to hearing the program. Shortwave reception from Romania is marginal most of the time, and the Radio Romania website is problematic at the best of times. If you time it right, one can hear programming direct over the internet via the website ([www.rri.ro](http://www.rri.ro)), but the Radio Romania website seems to have extremely limited bandwidth. Sometimes you can't listen at all, let alone call up any web pages. Other times you can listen for hours. The program is not available via the RRI broadcasts on WRN.

### RUSSIA:

Not surprisingly there are a number of history related programs on the Voice of Russia.



Russia just oozes history. I should declare my bias here as I was a Slavic Studies major at university. I took many courses related to Russian history and culture and have been enamored with it ever since.

Of course, post-Soviet Voice of Russia is a bit more open about its past. Some of the history related programs include:

**The Whims of Fate** is a series of programs about the life and acts of individuals, historical figures and ordinary people, who at various times affected the fate of their near and dear, and even of whole generations.

**The Whims of Fate** does not appear on the VoR program schedule, (perhaps an old series, or off the air temporarily?). However, its web page has an extensive and impressive list of links: [www.vor.ru/English/whims/whims\\_main.html](http://www.vor.ru/English/whims/whims_main.html)

**Encyclopedia – All Russia** is a history of Russian civilization based upon the Russian alphabet, where each letter tells a tale about a major event, an outstanding personality or places of interest that at various times graced Russian history and culture. Sun 0500, 1900; Mon 0500; Tues 0400; Sat 0700, 1700, 2100

**Our Homeland** focuses on the old, new and latest history of Russia, its prominent and ordinary citizens, both children and adults, in this country's political, scientific and cultural life of the past and present. The program is an addition to the regular **This Is Russia** feature. Sun 0230, 2030; Mon 0430, 1530, 2030; Wed 0530, Thurs 0330, 0630, 1530, 1830; Fri 0830

**Russia: People and Events** presents the history of Russia through events and personalities Sun 0330, 0830, 1515, 2015; Mon 2130; Wed 0330, 0830, 1830, 2130; Fri 1630, 2030; Sat 0330

**Russia – 1000 Years of Music** leads you, year by year, century by century, through the history of Russian music. Thurs 1730, 1930; Fri 0430 Here in North America, your best bet might be in the 0200-0500 period. All programs are available via WRN. [www.vor.ru/wrn.html](http://www.vor.ru/wrn.html) There is also some live audio via the VoR website. Click the "Live" icon in the masthead of the English home page.

#### SPAIN:

**Spain, Now and Then** is heard on Sunday broadcasts or Radio Exterior de



España. The program looks at how life in Spain has changed, recent history, or maybe a capsule look at a particular year in Spanish history. The URL for this program is just slightly shorter than this column. So try here: <http://tinyurl.com/uw9mr>

#### TAIWAN:

Radio Taiwan International does not have a history show per se. But on their website is an interesting documentary on the history of Dutch Formosa (Formosa being the main island of Taiwan. Called **Tales of Dutch Formosa**, it can be accessed at: [www.cbs.org.tw/English/TDF/intro.asp](http://www.cbs.org.tw/English/TDF/intro.asp)

#### UNITED STATES:

VoA Special English has a program called **The Making of a Nation** during UTC Thursday broadcasts.

### ❖ Swerving into History

A number of radio stations have history web-pages, or programs that occasionally swerve into historical topics. Among these are:

#### NETHERLANDS:

**Vox Humana** on Radio Netherlands is a real gem. While not specifically a history program, it is billed as "An intricate web of tales, tall and small, featuring life's misfits and heroes."

I heard a recent episode, with presenter David Swatling, which was a powerful story about the history of the AIDS epidemic, based on his friendship with an artist friend who had AIDS called "Cycling with Frits." Powerful radio indeed. You can hear the program UTC Saturdays at 0027, 0127 and 0527 on 6165 kHz. [www.radionetherlands.nl/radioprogrammes/voxhumana/](http://www.radionetherlands.nl/radioprogrammes/voxhumana/)

#### SOUTH AFRICA:

**Our Heritage** is heard on UTC Thursdays. Not strictly a history program, but it does touch on it from time to time. Certainly a different kind of history than we got from the old Radio RSA.

#### SWEDEN:

Radio Sweden has a monthly program called **The Greatest** which "introduces some of Sweden's most eminent figures through time." However, most of the people featured seem to be rather contemporary and predictable. Abba. Swedish princesses. Also, the Radio Sweden website doesn't exactly make it clear when the program is on. You can, if you wish, listen to all the episodes online.

[www.sr.se/cgi-bin/International/nyhetssidor/artikel.asp?nyheter=1&ProgramID=2054&Artikel=604685](http://www.sr.se/cgi-bin/International/nyhetssidor/artikel.asp?nyheter=1&ProgramID=2054&Artikel=604685)

### ❖ Via the Internet

#### UNITED KINGDOM:

Unless you live in the UK, you need to rely on the internet to hear domestic UK broadcasts. And what a treasure trove there is. Far too many to go into here, but a few gems you may want to check out.

**Making History** – Radio 4: Hosted by Nick Baker, listeners in the UK and sometimes abroad, send in questions about history, and the program will track down the answers. Occasionally, they will connect the questioner and a historian on the air. It's a very well done program. It's heard on Tuesdays, but is also off for long periods between series.

**A "Short" History of Ireland** – Radio

Ulster: This is a daily 5 minute program on the history of Ireland with a Sunday compilation of all the week's episodes. Why the quotes around short? It is a Short History of Ireland...in 240 episodes. I can't wait for the long version.

#### ECHOES OF A CENTURY:

And now we end this journey through history where we began. The **Echoes of a Century** program I referenced can be heard here: <http://tinyurl.com/wzyjz>

"The broadcasts are from Honolulu and Manila, and one from a jittery Seattle, on December 7 and 8, 1941. The first from Honolulu and the last from Manila contain descriptions of the Japanese bombings as they were still taking place.

"One thing to keep in mind as you listen to this is that the reporters broadcasting from Manila – Ford Wilkins for CBS and Bert Silen and Don Bell of NBC – were captured by the Japanese within a month of these broadcasts and survived over three years as Prisoners of War at the Santo Tomas prison camp. All three resumed their careers after Santo Tomas was liberated in February 1945, Wilkins becoming the editor of a Manila newspaper and Silen and Bell returning to the U.S. to report news for NBC and Mutual." (Daevide Mackenzie)

It's fascinating to hear these actual live audio recordings from times past. (Not to mention putting oneself in the shoes of reporters covering Manila, who would soon become prisoners for years.) If you poke around the show archives you will find many such gems. Many of his programs contain shortwave clips. Each program focuses on one topic. Show topics include Tokyo Rose, Dallas radio, November 22, 1963, Wolfman Jack on Mexican Radio, D-Day, Baseball and Satchel Paige, and the Wit of JFK. Fascinating stuff. Dozens of past shows archived online. Go to the link mentioned above and click the program title to get to the archive pages.

One of the most famous broadcasts of World War Two, Churchill's "We shall fight them on the beaches, we shall never surrender!" speech was recently given a new light. During a BBC Radio 4 program on The Art of Rhetoric, it was revealed that as recording of the speech concluded, Churchill turned to an aide and added "and we will beat them about the head with beer bottles, because that's all we bloody well have left." Churchill understood the power of radio and the power of words to rally the nation in times of peril.

Finally, by the time you have this article in your hands or on your desktop, links to all programs mentioned in my columns will also be on my blog, at [www.doghousecharlie.com](http://www.doghousecharlie.com).

### Daniel Sampson's PRIME TIME SHORTWAVE

<http://www.primetimeshortwave.com>

Your guide for up-to-date English shortwave schedules sorted by time, country and frequency plus a DX media program guide and newsletter



## The Low-Down for Beacon Heads

With last month's focus on LOWfers and MEDfers, it's time to take a look at low-powered beacons, known as Non-Directional Beacons. Next time you tune down around 190-535 kHz and hear Morse code, you have what is known in the hobby as an NDB.

Beacon signals transmit twenty-four hours using Morse code consisting of one, two or three letters or digits. NDBs guide pilots or mariners as they travel across the globe.

By following the changes of propagation, longwave DXers can log beacons from hundreds or even thousands of miles away as signals can change hour by hour or night to night.

Oftentimes, signals may fade in quite loudly, much to the delight of beacon chasers. To add to the excitement of the chase, follow up by verifying these low-powered signals. Most beacon-heads seek not only a verification, but background information on the transmitting facility. Beacon QSLers use a generic form of addressing for stations located in the United States. The basic address is: Airport Manager, Flight Services, Name of Airport, city, state and zip code. If the station

is an FAA controlled facility, the address is: FAA Field Office, Name of Airport, city, state, and zip code.

Reception reports must include a self-prepared QSL card and may be hand-designed or computer printed for a more professional appearance. Information should include station identifier, station location, frequency, date/time of reception, verification of reception statement, area for signature or station stamp, and a blank space for location transmitting power or antenna. By including this information in a concise manner, the receiving station should have little reason to question your reception.

Return mint postage should be included as well as a souvenir post card or other interesting enclosure to attract the attention of the signer. A self-addressed envelope is a must, and provides successful results for most beacon DXers.

For additional information on beacon DXing, subscription to *The Lowdown* publication, feature articles and more, visit the website of the *Longwave Club of America* [www.lwca.org](http://www.lwca.org) It's a great place to get the low-down on beacon chasing.

### AMATEUR RADIO

Brazil, PY2NY 10 meters SSB. Two full data cards. Received in 65 days via ARRL bureau. (L. Van Horn, NC)

Montserrat, VP2MDY 3.5 MHz CW. Full data QSL card via Art Blank. Received in 30 days for a SWL card and a SASE. QSL address: 5055 N. Lak-A-Yucca Road, Tucson, AZ 85743. (Greg Harris, Park Forest, IL)



Venezuela, YV5EED 17 meters SSB. Two full data color cards. Received in 65 days via ARRL bureau. (Van Horn, NC)

### CLANDESTINE

Radio Oriente Libre and La Voz de la Coordinadora de Ex-Políticos Cubanos, 9955 kHz via WRMI. Large full data MSC Cruise ship cards, signed by Jeff White. Received in 18 weeks. QSL address: c/o Radio Miami International, 175 Fontainebleau Blvd., Suite 1N4, Miami, FL 33172. (Wendel Craighead, Prairie Village, KS) Web: [www.wrmi.net](http://www.wrmi.net)

Voice of Tibet via Talata, Madagascar 17550 kHz. Full data large map folder card signed by Rahamefy Eddy 5R8FT-Technical Department. Website at [www.vot.org/](http://www.vot.org/) notes this frequency is for India and Nepal. Received in six weeks. Report was sent to



Radio Netherlands-Madagascar relay station at: P.O. Box 404, Antananrivo, 101 Madagascar. (Craighead, KS)

### GERMANY

Radio Farda via Wertachtal, 7105 kHz. Verification via Walter Broadowsky at T-Systems International. Received in seven hours via [walterbrowsky@t-systems.com](mailto:walterbrowsky@t-systems.com) (Wendel Craighead, Prairie Village, KS)

### LATVIA

Radio Marabu relay via Ulbroka, Latvia 9290 kHz. Full data Marabu Bird with illegible signature, plus sticker and info sheet. Received in nine days after second follow-up report. QSL address: Radio Marabu, Postfach 1166, 49187 Belm, Germany, (Edward Kusalik, Alberta, Canada)

### MEDIUM WAVE

CKDO 1580 kHz AM. Full data antenna card signed by Gary Bernarde. Received in 25 days for an AM report of their special 60th anniversary broadcast, with return mint postage (used) and return address label (used). Station address: Durham Radio, Inc., 1200 Airport Blvd., Suite 207, Oshawa, ON Canada L1J 8P5 (Bill Wilkins, Springfield, MO)

KRJO 1680 kHz AM (*Rejoice Gospel Gold*). Full data prepared QSL card signed by C.H. Murray-Station Manager. Received in seven days for third follow-up report. Station address: Rejoice Gospel Gold 1680 AM, 1109 Hudson Lane, Monroe, LA 71201. (John Wilkins, Wheat Ridge, CO) Web: <http://rejoice1680.com/home.html>

KQKE 960 kHz AM. (*The Quake*). Full data verification letter signed by Susan Wells-Promotions Director, plus station sticker. Received for an AM report. Station address: 340 Townsend Street, San Francisco, CA 94107. (Craig Edwards, Nhulumbuy (Gove) NT Australia) Web: [www.quakeradio.com/main.html](http://www.quakeradio.com/main.html)

WLLL, Lynchburg, VA 930 kHz AM. Partial data church paper QSL, signed by Les Rayburn, NRC/IRCA Broadcast Test Coordinator. Received in 15 days for a follow-up of 2005 DX Test., and SASE. QSL address: Les Rayburn, High Noon Film, 100 Centerview Drive, Suite 111, Birmingham, AL 35216. (Wilkins, MO)

WNJC, Vineland, NJ 1360 kHz. Full data scenes of Philadelphia paper QSL, signed by Les Rayburn. Received in nine days for an SASE and a taped report of DX Test. QSL address: (same as WLLL) (Wilkins, MO)

Mongolia, Ulaanbaatar, 164 kHz AM. Full data QSL card signed by Densmaa Zorigt-Mail Editor, plus tourist info and additional verification letter. Received in 73 days for a CD/cassette report and two U.S. dollars. Station address: The Voice of Mongolia, CPO Box 365, Ulaanbaatar 13, Mongolia. (Patrick Martin, Seaside, OR)

### PIRATE

Northwoods Radio 6950 kHz USB. Full data verification letter and CD. Received in 30 days for a pirate report for CKLW revival program to: [northwoodsradio@yahoo.com](mailto:northwoodsradio@yahoo.com) (Joe Wood, Greenback, TN)

WBNY 6925 kHz USB. Full data Rabbit logo certificate QSL and Halloween mask. Received in four months and six days for a pirate report and three first class postage stamps. QSL maildrop: P.O. Box 1, Belfast, NY 14711. (Wood, TN)

### SRI LANKA

Deewa Radio (Voice of America service to Afghanistan-Pakistan border) via Iranawila, 11510 kHz. Full data Sri Lanka antenna card (except for program name), signed by Carl G. Britt, Jr.-Station Manager. Received in five weeks. QSL address: Station Manager, IBB Sri Lanka Transmitting Station, c/o Embassy, 210 Galle Road, Colombo 3, Sri Lanka. (Craighead, KS)



## HOW TO USE THE SHORTWAVE GUIDE

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af  
 ① ② ⑤ ③ ④ ⑥ ⑦

### Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Standard Time) 5, 6, 7 or 8 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each hour.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC Sunday will be heard on Saturday evening in America (in other words, 7:30 pm Eastern, 6:30 pm Central, etc.).

### Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. On the top half of the page English broadcasts are listed by UTC time on ①, then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not daily, the days of broadcast ⑤ will appear in the column following the time of broadcast, using the following codes:

| Day Codes |                        |
|-----------|------------------------|
| s/S       | Sunday                 |
| m/M       | Monday                 |
| t/T       | Tuesday                |
| w/W       | Wednesday              |
| h/H       | Thursday               |
| f/F       | Friday                 |
| a/A       | Saturday               |
| D         | Daily                  |
| mon/MON   | monthly                |
| occ:      | occasional             |
| DRM:      | Digital Radio Mondiale |

In the same column ⑤, irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

### Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions.

But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and MT readers to make the Shortwave Guide up-to-date as of one week before print deadline.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

| Target Areas |                                           |
|--------------|-------------------------------------------|
| af:          | Africa                                    |
| al:          | alternate frequency (occasional use only) |
| am:          | The Americas                              |
| as:          | Asia                                      |
| ca:          | Central America                           |
| do:          | domestic broadcast                        |
| eu:          | Europe                                    |
| irr:         | irregular (Costa Rica RFPI)               |
| me:          | Middle East                               |
| na:          | North America                             |
| oc:          | Oceania                                   |
| pa:          | Pacific                                   |
| sa:          | South America                             |
| va:          | various                                   |

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## Thank You ...

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### Shortwave Broadcast Bands

| kHz         | Meters                                                                                       |
|-------------|----------------------------------------------------------------------------------------------|
| 2300-2495   | 120 meters (Note 1)                                                                          |
| 3200-3400   | 90 meters (Note 1)                                                                           |
| 3900-3950   | 75 meters (Regional band, used for broadcasting in Asia only)                                |
| 3950-4000   | 75 meters (Regional band, used for broadcasting in Asia and Europe)                          |
| 4750-4995   | 60 meters (Note 1)                                                                           |
| 5005-5060   | 60 meters (Note 1)                                                                           |
| 5730-5900   | 49 meter NIB (Note 2)                                                                        |
| 5900-5950   | 49 meter WARC-92 band (Note 3)                                                               |
| 5950-6200   | 49 meters                                                                                    |
| 6200-6295   | 49 meter NIB (Note 2)                                                                        |
| 6890-6990   | 41 meter NIB (Note 2)                                                                        |
| 7100-7300   | 41 meters (Regional band, not allocated for broadcasting in the western hemisphere) (Note 4) |
| 7300-7350   | 41 meter WARC-92 band (Note 3)                                                               |
| 7350-7600   | 41 meter NIB (Note 2)                                                                        |
| 9250-9400   | 31 meter NIB (Note 2)                                                                        |
| 9400-9500   | 31 meter WARC-92 band (Note 3)                                                               |
| 9500-9900   | 31 meters                                                                                    |
| 11500-11600 | 25 meter NIB (Note 2)                                                                        |
| 11600-11650 | 25 meter WARC-92 band (Note 3)                                                               |
| 11650-12050 | 25 meters                                                                                    |
| 12050-12100 | 25 meter WARC-92 band (Note 3)                                                               |
| 12100-12600 | 25 meter NIB (Note 2)                                                                        |
| 13570-13600 | 22 meter WARC-92 band (Note 3)                                                               |
| 13600-13800 | 22 meters                                                                                    |
| 13800-13870 | 22 meter WARC-92 band (Note 3)                                                               |
| 15030-15100 | 19 meter NIB (Note 2)                                                                        |
| 15100-15600 | 19 meters                                                                                    |
| 15600-15800 | 19 meter WARC-92 band (Note 3)                                                               |
| 17480-17550 | 17 meter WARC-92 band (Note 3)                                                               |
| 17550-17900 | 17 meters                                                                                    |
| 18900-19020 | 15 meter WARC-92 band (Note 3)                                                               |
| 21450-21850 | 13 meters                                                                                    |
| 25670-26100 | 11 meters                                                                                    |

### Notes

- Note 1 Tropical bands, 120/90/60 meters are for broadcast use only in designated tropical areas of the world.
- Note 2 Broadcasters can use this frequency range on a (NIB) non-interference basis only.
- Note 3 WARC-92 bands are allocated officially for use by HF broadcasting stations in 2007. They are only authorized on a non-interference basis until that date.
- Note 4 WRC-03 update. After March 29, 2009, the spectrum from 7100-7200 kHz will no longer be available for broadcast purposes and will be turned over to amateur radio operations worldwide

**GLENN HAUSER'S  
WORLD OF RADIO**  
<http://www.worldofradio.com>

For the latest DX and programming news, amateur nets, DX program schedules, audio archives and much more!



# 0000 UTC - 7PM EST / 6PM CST / 4PM PST

|      |      |                                         |                       |  |
|------|------|-----------------------------------------|-----------------------|--|
| 0000 | 0015 | Japan, Radio Japan/NHK World            | 13650as               |  |
|      |      | 17810as                                 |                       |  |
| 0000 | 0030 | Australia, Radio 9660as 12080as 13670as |                       |  |
|      |      | 15240pa 17715as 17750va 17775va         |                       |  |
|      |      | 17795va                                 |                       |  |
| 0000 | 0030 | Burma, Dem Voice of Burma               | 5955eu                |  |
| 0000 | 0030 | Egypt, Radio Cairo 11885na              |                       |  |
| 0000 | 0030 | Thailand, Radio 9680af                  |                       |  |
| 0000 | 0030 | UK, BBC World Service                   | 3915as 11945as        |  |
|      |      | 17615as                                 |                       |  |
| 0000 | 0030 | USA, Voice of America                   | 7405as                |  |
| 0000 | 0045 | India, All India Radio                  | 9705as 9950as         |  |
|      |      | 11620as 11645as 13605as                 |                       |  |
| 0000 | 0057 | Canada, Radio Canada Intl               | 9880as                |  |
| 0000 | 0057 | Netherlands, Radio                      | 6165na                |  |
| 0000 | 0059 | Spain, Radio Exterior Espana            | 6055am                |  |
| 0000 | 0100 | Anguilla, University Network            | 6090am                |  |
| 0000 | 0100 | Australia, ABC NT Alice Springs         | 2310do                |  |
|      |      | 4835do                                  |                       |  |
| 0000 | 0100 | Australia, ABC NT Katherine             | 5025do                |  |
| 0000 | 0100 | Australia, ABC NT Tennant Creek         | 4910do                |  |
| 0000 | 0100 | Bulgaria, Radio 7400na                  | 9700na                |  |
| 0000 | 0100 | Canada, CFRX Toronto ON                 | 6070na                |  |
| 0000 | 0100 | Canada, CFVP Calgary AB                 | 6030na                |  |
| 0000 | 0100 | Canada, CKZN St John's NF               | 6160na                |  |
| 0000 | 0100 | Canada, CKZU Vancouver BC               | 6160na                |  |
| 0000 | 0100 | China, China Radio Intl                 | 6020na 6075as         |  |
|      |      | 7130as 7180as 9425na 9570as             |                       |  |
|      |      | 11650as 11885as                         |                       |  |
| 0000 | 0100 | Costa Rica, University Network          | 5030va 6150va         |  |
|      |      | 7375va 9725va                           |                       |  |
| 0000 | 0100 | Germany, Deutsche Welle                 | 7265as 9900as         |  |
|      |      | 15320as                                 |                       |  |
| 0000 | 0100 | Guyana, Voice of                        | 3291do                |  |
| 0000 | 0100 | Japan, Radio Japan/NHK World            | 6145na                |  |
| 0000 | 0100 | Malaysia, RTM/Trax FM                   | 7295as                |  |
| 0000 | 0100 | Namibia, Namibian BC Corp               | 3270do 3290do         |  |
|      |      | 6060do 6175do                           |                       |  |
| 0000 | 0100 | New Zealand, Radio NZ Intl              | 15720pa               |  |
| 0000 | 0100 | New Zealand, Radio NZ Intl              | 17675pa               |  |
| 0000 | 0100 | Papua New Guinea, Wantok R. Light       | 7120va                |  |
| 0000 | 0100 | Singapore, MediaCorp Radio              | 6150do                |  |
| 0000 | 0100 | UK, BBC World Service                   | 5970as 6195as         |  |
|      |      | 9605as 9740as 11955as 15285as           |                       |  |
|      |      | 15360as                                 |                       |  |
| 0000 | 0100 | UK, BBC World Service                   | 6010na                |  |
| 0000 | 0100 | UK, Bible Voice                         | 5945me                |  |
| 0000 | 0100 | USA, American Forces Radio              | 4319usb 5446usb       |  |
|      |      | 5765usb 6350usb 7811usb 10320usb        |                       |  |
|      |      | 12133usb 13362usb                       |                       |  |
| 0000 | 0100 | USA, KAIJ Dallas TX                     | 5755na                |  |
| 0000 | 0100 | USA, KTBN Salt Lake City UT             | 7505na 15590na        |  |
| 0000 | 0100 | USA, WBCQ Kennebunk ME                  | 5110na 7415na         |  |
|      |      | 9330na                                  |                       |  |
| 0000 | 0100 | USA, WBOH Newport NC                    | 5920am                |  |
| 0000 | 0100 | USA, WEWN Birmingham AL                 | 5810va                |  |
| 0000 | 0100 | USA, WHRA Greenbush ME                  | 5850na                |  |
| 0000 | 0100 | USA, WHRI Cypress Creek SC              | 7315am 7490am         |  |
| 0000 | 0100 | USA, WINB Red Lion PA                   | 9265am                |  |
| 0000 | 0100 | USA, WRMI Miami FL                      | 7385na                |  |
| 0000 | 0100 | USA, WRMI Miami FL                      | 9955am                |  |
| 0000 | 0100 | USA, WTJC Newport NC                    | 9370na                |  |
| 0000 | 0100 | USA, WWCR Nashville TN                  | 3215na 5070na         |  |
|      |      | 7465na 13845na                          |                       |  |
| 0000 | 0100 | USA, WWRB Manchester TN                 | 6890na                |  |
| 0000 | 0100 | USA, WYFR/Family R Okeechobee FL        | 6065na                |  |
|      |      | 9505na 9715na 11720am                   |                       |  |
| 0000 | 0100 | Zambia, Christian Voice                 | 4965af                |  |
| 0005 | 0030 | Sun/Mon Austria, Radio Austria Intl     | 7325na                |  |
| 0005 | 0100 | Canada, Radio Canada Intl               | 9755am                |  |
| 0013 | 0028 | twhfa Austria, Radio Austria Intl       | 7325na                |  |
| 0030 | 0045 | s Germany, Pan American BC              | 6165as                |  |
| 0030 | 0100 | Australia, Radio 9660as 12080as 13670as |                       |  |
|      |      | 15240pa 15415as 17715as 17750va         |                       |  |
|      |      | 17795va                                 |                       |  |
| 0030 | 0100 | m Greece, Voice of                      | 7475eu 9420eu 12105va |  |
| 0030 | 0100 | Greece, Voice of                        | 12105af               |  |
| 0030 | 0100 | Lithuania, Radio Vilnius                | 9875na                |  |
| 0030 | 0100 | Thailand, Radio                         | 5890na                |  |
| 0030 | 0100 | UK, Bible Voice                         | 5955as                |  |
| 0030 | 0100 | USA, Voice of America                   | 7120va 9620va         |  |
|      |      | 11695va 11725va 11805va 12005va         |                       |  |
|      |      | 15185va 15205va                         |                       |  |
| 0033 | 0100 | Sun/Mon Austria, Radio Austria Intl     | 7325na                |  |
| 0043 | 0058 | twhfa Austria, Radio Austria Intl       | 7325na                |  |
| 0055 | 0100 | Italy, RAI Intl                         | 11800na               |  |

# 0100 UTC - 8PM EST / 7PM CST / 5PM PST

|      |      |                           |        |
|------|------|---------------------------|--------|
| 0100 | 0105 | Canada, Radio Canada Intl | 9755am |
|------|------|---------------------------|--------|

|      |      |                                         |                       |  |
|------|------|-----------------------------------------|-----------------------|--|
| 0100 | 0115 | Italy, RAI Intl                         | 11800na               |  |
| 0100 | 0127 | Czech Rep, Radio Prague                 | 6200na 7345na         |  |
| 0100 | 0128 | Vietnam, Voice of                       | 6175na                |  |
| 0100 | 0130 | s Germany, Universal Life               | 7260as                |  |
| 0100 | 0130 | m Greece, Voice of                      | 7475eu 9420eu 12105va |  |
| 0100 | 0130 | Greece, Voice of                        | 12105af               |  |
| 0100 | 0130 | Slovakia, Radio Slovakia Intl           | 7230na 9440sa         |  |
| 0100 | 0156 | Romania, Radio Romania Intl             | 6150na 9515na         |  |
| 0100 | 0157 | Canada, Radio Canada Intl               | 5840as 5970as         |  |
| 0100 | 0157 | Netherlands, Radio                      | 6165na                |  |
| 0100 | 0200 | Anguilla, University Network            | 6090am                |  |
| 0100 | 0200 | Australia, ABC NT Katherine             | 5025do                |  |
| 0100 | 0200 | Australia, ABC NT Tennant Creek         | 4910do                |  |
| 0100 | 0200 | Australia, Radio 9660as 12080as 13670as |                       |  |
|      |      | 15240pa 15415as 15515as 17715as         |                       |  |
|      |      | 17750va 17795va 21745va                 |                       |  |
| 0100 | 0200 | Canada, CFRX Toronto ON                 | 6070na                |  |
| 0100 | 0200 | Canada, CFVP Calgary AB                 | 6030na                |  |
| 0100 | 0200 | Canada, CKZN St John's NF               | 6160na                |  |
| 0100 | 0200 | Canada, CKZU Vancouver BC               | 6160na                |  |
| 0100 | 0200 | China, China Radio Intl                 | 6005na 6020na         |  |
|      |      | 6075as 6080na 7130eu 7180as             |                       |  |
|      |      | 9570na 9580na 11650as 11885as           |                       |  |
| 0100 | 0200 | Costa Rica, University Network          | 5030va 6150va         |  |
|      |      | 7375va 9725va                           |                       |  |
| 0100 | 0200 | Cuba, Radio Havana                      | 6000na 6060na         |  |
|      |      | 6180na                                  |                       |  |
| 0100 | 0200 | Guyana, Voice of                        | 3291do                |  |
| 0100 | 0200 | Indonesia, Voice of                     | 9525as 11785pa        |  |
|      |      | 15150al                                 |                       |  |
| 0100 | 0200 | Japan, Radio Japan/NHK World            | 6030va 17685pa        |  |
|      |      | 11860as 11935sa 15325as 17845as         |                       |  |
|      |      | 17810as 17825ca 7295as                  |                       |  |
| 0100 | 0200 | Malaysia, RTM/Trax FM                   | 3270do 3290do         |  |
| 0100 | 0200 | vi Namibia, Namibian BC Corp            | 6060do 6175do         |  |
| 0100 | 0200 | DRM New Zealand, Radio NZ Intl          | 15720pa               |  |
| 0100 | 0200 | DRM New Zealand, Radio NZ Intl          | 17675pa               |  |
| 0100 | 0200 | North Korea, Voice of Korea             | 7140as 9345as         |  |
|      |      | 9730am 11735am 13760am 15180am          |                       |  |
| 0100 | 0200 | vi Papua New Guinea, Wantok R. Light    | 7120va                |  |
| 0100 | 0200 | Singapore, MediaCorp Radio              | 6150do                |  |
| 0100 | 0200 | Sri Lanka, SLBC                         | 6005as 9770as 15745as |  |
| 0100 | 0200 | Taiwan, Radio Taiwan Intl               | 11875na 15465na       |  |
| 0100 | 0200 | UK, BBC World Service                   | 7320as 9605as         |  |
|      |      | 11955as 15285as 15310as 15360as         |                       |  |
| 0100 | 0200 | f UK, Bible Voice                       | 5945me                |  |
| 0100 | 0200 | Ukraine, Radio Ukraine Intl             | 5820na                |  |
| 0100 | 0200 | USA, American Forces Radio              | 4319usb 5446usb       |  |
|      |      | 5765usb 6350usb 7811usb 10320usb        |                       |  |
|      |      | 12133usb 13362usb                       |                       |  |
| 0100 | 0200 | USA, KAIJ Dallas TX                     | 5755na                |  |
| 0100 | 0200 | USA, KTBN Salt Lake City UT             | 7505na                |  |
| 0100 | 0200 | USA, KWHR Naalehu HI                    | 17655as               |  |
| 0100 | 0200 | USA, Voice of America                   | 11705va 12005va       |  |
| 0100 | 0200 | USA, WBCQ Kennebunk ME                  | 5110na 7415na         |  |
|      |      | 9330na                                  |                       |  |
| 0100 | 0200 | USA, WBOH Newport NC                    | 5920am                |  |
| 0100 | 0200 | USA, WEWN Birmingham AL                 | 5810va                |  |
| 0100 | 0200 | USA, WHRA Greenbush ME                  | 5850na                |  |
| 0100 | 0200 | USA, WHRI Cypress Creek SC              | 5860am 7490am         |  |
| 0100 | 0200 | sm USA, WHRI Cypress Creek SC           | 7315am                |  |
| 0100 | 0200 | USA, WINB Red Lion PA                   | 9265am                |  |
| 0100 | 0200 | twhfa USA, WRMI Miami FL                | 7385na                |  |
| 0100 | 0200 | sm USA, WRMI Miami FL                   | 9955am                |  |
| 0100 | 0200 | USA, WTJC Newport NC                    | 9370na                |  |
| 0100 | 0200 | USA, WWCR Nashville TN                  | 3215na 5070na         |  |
|      |      | 5935na 7465na                           |                       |  |
| 0100 | 0200 | USA, WWRB Manchester TN                 | 6890na                |  |
| 0100 | 0200 | USA, WYFR/Family R Okeechobee FL        | 6065na                |  |
|      |      | 9505na 15195as                          |                       |  |
| 0100 | 0200 | Uzbekistan, Christian Vision            | 7355as                |  |
| 0100 | 0200 | Zambia, Christian Voice                 | 4965af                |  |
| 0105 | 0159 | Sun/Mon Canada, Radio Canada Intl       | 9755am                |  |
| 0115 | 0130 | twhf Seychelles, FEBA                   | 5885as                |  |
| 0130 | 0200 | Iran, Voice of the Islamic Rep          | 6120na 7160na         |  |
| 0130 | 0200 | Sweden, Radio                           | 11550va               |  |
| 0130 | 0200 | USA, Voice of America                   | 5960va                |  |
| 0130 | 0200 | twhfa USA, Voice of America             | 7405va                |  |
| 0140 | 0200 | Vatican City, Vatican Radio             | 5915va 7335va         |  |

# 0200 UTC - 9PM EST / 8PM CST / 6PM PST

|      |      |                                   |               |
|------|------|-----------------------------------|---------------|
| 0200 | 0205 | Sun/Mon Canada, Radio Canada Intl | 9755am        |
| 0200 | 0227 | Czech Rep, Radio Prague           | 6200na 7345na |
| 0200 | 0227 | Iran, Voice of the Islamic Rep    | 6120na 7160na |
| 0200 | 0228 | Hungary, Radio Budapest           | 6110na        |
| 0200 | 0300 | Anguilla, University Network      | 6090am        |
| 0200 | 0300 | twhfa Argentina, RAE              | 11710am       |
| 0200 | 0300 | Australia, ABC NT Alice Springs   | 2310do        |
|      |      | 4835do                            |               |
| 0200 | 0300 | Australia, ABC NT Katherine       | 5025do        |

|      |      |                                   |         |          |
|------|------|-----------------------------------|---------|----------|
| 0200 | 0300 | Australia, ABC NT Tennant Creek   | 4910do  |          |
| 0200 | 0300 | Australia, Radio 9660as 12080as   | 13670as |          |
|      |      | 15240pa 15415as                   | 15515as | 17750va  |
|      |      | 21725va                           |         |          |
| 0200 | 0300 | Canada, CFRX Toronto ON           | 6070na  |          |
| 0200 | 0300 | Canada, CFVP Calgary AB           | 6030na  |          |
| 0200 | 0300 | Canada, CKZN St John's NF         | 6160na  |          |
| 0200 | 0300 | Canada, CKZU Vancouver BC         | 6160na  |          |
| 0200 | 0300 | China, China Radio Intl           | 11770as | 13640as  |
| 0200 | 0300 | Costa Rica, University Network    | 5030va  | 6150va   |
|      |      | 7375va 9725va                     |         |          |
| 0200 | 0300 | Cuba, Radio Havana                | 6000na  | 6060na   |
|      |      | 6180na                            |         |          |
| 0200 | 0300 | Egypt, Radio Cairo                | 7270na  |          |
| 0200 | 0300 | Guyana, Voice of                  | 3291do  |          |
| 0200 | 0300 | Malaysia, RTM/Trax FM             | 7295as  |          |
| 0200 | 0300 | Namibia, Namibian BC Corp         | 3270do  | 3290do   |
|      |      | 6060do 6175do                     |         |          |
| 0200 | 0300 | New Zealand, Radio NZ Intl        | 15720pa |          |
| 0200 | 0300 | New Zealand, Radio NZ Intl        | 17675pa |          |
| 0200 | 0300 | North Korea, Voice of Korea       | 13650as | 15100as  |
| 0200 | 0300 | Papua New Guinea, Wantok R. Light | 7120va  |          |
| 0200 | 0300 | Philippines, Radio Pilipinas      | 11885va | 15270va  |
|      |      | 17665va                           |         |          |
| 0200 | 0300 | Russia, Voice of                  | 6230na  | 7250na   |
|      |      | 15425na                           |         | 13665na  |
| 0200 | 0300 | Singapore, MediaCorp Radio        | 6150do  |          |
| 0200 | 0300 | South Korea, KBS World Radio      | 15575na | 9560na   |
| 0200 | 0300 | Sri Lanka, SLBC                   | 6005as  | 9770as   |
| 0200 | 0300 | UK, BBC World Service             | 6035af  | 6195as   |
|      |      | 7320as 11750as                    | 11955as | 15285as  |
|      |      | 15310as 15360as                   | 17760as |          |
| 0200 | 0300 | USA, American Forces Radio        | 4319usb | 5446usb  |
|      |      | 5765usb 6350usb                   | 7811usb | 10320usb |
|      |      | 12133usb 13362usb                 |         |          |
| 0200 | 0300 | USA, KAIJ Dallas TX               | 5755na  |          |
| 0200 | 0300 | USA, KJES Vado NM                 | 7555na  |          |
| 0200 | 0300 | USA, KTVN Salt Lake City UT       | 7505na  |          |
| 0200 | 0300 | USA, KWHR Naalehu HI              | 17655as |          |
| 0200 | 0300 | USA, WBCQ Kennebunk ME            | 5110na  | 7415na   |
|      |      | 9330na                            |         |          |
| 0200 | 0300 | USA, WBOH Newport NC              | 5920am  |          |
| 0200 | 0300 | USA, WEWN Birmingham AL           | 5810va  |          |
| 0200 | 0300 | USA, WHRA Greenbush ME            | 5850na  |          |
| 0200 | 0300 | USA, WHRI Cypress Creek SC        | 7315am  |          |
| 0200 | 0300 | USA, WHRI Cypress Creek SC        | 5860am  | 7490am   |
| 0200 | 0300 | USA, WINB Red Lion PA             | 9265am  |          |
| 0200 | 0300 | USA, WRMI Miami FL                | 7385na  |          |
| 0200 | 0300 | USA, WRMI Miami FL                | 9955am  |          |
| 0200 | 0300 | USA, WTJC Newport NC              | 9370na  |          |
| 0200 | 0300 | USA, WWCN Nashville TN            | 3215na  | 5070na   |
|      |      | 5765na 5935na                     |         |          |
| 0200 | 0300 | USA, WWRB Manchester TN           | 6890na  |          |
| 0200 | 0300 | USA, WYFR/Family R Okeechobee FL  | 5985am  |          |
|      |      | 6065na 9505na                     | 9525na  | 11855am  |
| 0200 | 0300 | Uzbekistan, Christian Vision      | 7355as  |          |
| 0200 | 0300 | Zambia, Christian Voice           | 4965af  |          |
| 0200 | 0300 | Taiwan, Radio Taiwan Intl         | 5950na  | 9680na   |
| 0215 | 0220 | Vatican City, Vatican Radio       | 12070va |          |
| 0215 | 0230 | Nepal, Radio                      | 3230as  | 5005as   |
|      |      | 7165as                            |         | 6100as   |
| 0230 | 0258 | Vietnam, Voice of                 | 6175na  |          |
| 0230 | 0300 | Sweden, Radio                     | 6010na  |          |
| 0245 | 0300 | Albania, Radio Tirana             | 6115eu  | 7465eu   |
| 0245 | 0300 | Myanmar, Radio                    | 9730do  |          |
| 0250 | 0300 | Vatican City, Vatican Radio       | 7305am  | 9610am   |

## 0300 UTC - 10PM EST / 9PM CST / 7PM PST

|      |      |                                 |         |         |
|------|------|---------------------------------|---------|---------|
| 0300 | 0315 | Croatia, Croatian Radio         | 7285na  |         |
| 0300 | 0320 | Vatican City, Vatican Radio     | 7305am  | 9610am  |
| 0300 | 0330 | Egypt, Radio Cairo              | 7270na  |         |
| 0300 | 0330 | Myanmar, Radio                  | 9730do  |         |
| 0300 | 0330 | Philippines, Radio Pilipinas    | 11885va | 15270va |
|      |      | 17665va                         |         |         |
| 0300 | 0330 | Swaziland, TWR                  | 3200af  |         |
| 0300 | 0330 | Thailand, Radio                 | 5890na  |         |
| 0300 | 0330 | USA, KJES Vado NM               | 7555na  |         |
| 0300 | 0330 | USA, WBCQ Kennebunk ME          | 9330na  |         |
| 0300 | 0330 | Vatican City, Vatican Radio     | 7360af  |         |
| 0300 | 0358 | Germany, Deutsche Welle         | 7330as  | 9480as  |
|      |      | 9785as                          |         |         |
| 0300 | 0400 | Anguilla, University Network    | 6090am  |         |
| 0300 | 0400 | Australia, ABC NT Alice Springs | 4835do  | 2310do  |
| 0300 | 0400 | Australia, ABC NT Katherine     | 5025do  |         |
| 0300 | 0400 | Australia, ABC NT Tennant Creek | 4910do  |         |
| 0300 | 0400 | Australia, Radio 9660as 12080as | 13670as |         |
|      |      | 15240pa 15415as                 | 15515as | 17750va |
|      |      | 21725va                         |         |         |
| 0300 | 0400 | Bulgaria, Radio                 | 7400na  | 9700na  |

|      |      |          |                                   |         |          |
|------|------|----------|-----------------------------------|---------|----------|
| 0300 | 0400 | twhf     | Canada, CBC NQ SW Service         | 9625na  |          |
| 0300 | 0400 |          | Canada, CFRX Toronto ON           | 6070na  |          |
| 0300 | 0400 |          | Canada, CFVP Calgary AB           | 6030na  |          |
| 0300 | 0400 |          | Canada, CKZN St John's NF         | 6160na  |          |
| 0300 | 0400 |          | Canada, CKZU Vancouver BC         | 6160na  |          |
| 0300 | 0400 |          | China, China Radio Intl           | 6190na  | 9460as   |
|      |      |          | 9690na 9790na                     | 11770as | 13620as  |
|      |      |          | 15110as 15120as                   |         |          |
| 0300 | 0400 |          | Costa Rica, University Network    | 5030va  | 6150va   |
|      |      |          | 7375va 9725va                     |         |          |
| 0300 | 0400 |          | Cuba, Radio Havana                | 6000na  | 6060na   |
|      |      |          | 6180na                            |         |          |
| 0300 | 0400 |          | Guyana, Voice of                  | 3291do  |          |
| 0300 | 0400 |          | Japan, Radio Japan/NHK World      |         | 21610pa  |
| 0300 | 0400 |          | Malaysia, RTM/Trax FM             | 7295as  |          |
| 0300 | 0400 |          | Malaysia, RTM/Voice of Malaysia   |         | 6175as   |
|      |      |          | 9750as 15295as                    |         |          |
| 0300 | 0400 | vl       | Namibia, Namibian BC Corp         | 3270do  | 3290do   |
|      |      |          | 6060do 6175do                     |         |          |
| 0300 | 0400 |          | New Zealand, Radio NZ Intl        | 15720pa |          |
| 0300 | 0400 | DRM      | New Zealand, Radio NZ Intl        | 17675pa |          |
| 0300 | 0400 |          | North Korea, Voice of Korea       | 7140as  | 9345as   |
|      |      |          | 9730as                            |         |          |
| 0300 | 0400 | vl       | Papua New Guinea, Wantok R. Light | 7120va  |          |
| 0300 | 0400 |          | Russia, Voice of                  | 5995me  | 6240na   |
|      |      |          | 13665na 15425na                   |         | 7350na   |
| 0300 | 0400 | vl       | Rwanda, Radio                     | 6055do  |          |
| 0300 | 0400 |          | Singapore, MediaCorp Radio        | 6150do  |          |
| 0300 | 0400 |          | South Africa, Channel Africa      | 3345af  | 7390af   |
| 0300 | 0400 |          | Sri Lanka, SLBC                   | 6005as  | 9770as   |
| 0300 | 0400 |          | Taiwan, Radio Taiwan Intl         | 5950na  | 15215as  |
|      |      |          | 15320as                           |         |          |
| 0300 | 0400 | s        | UK, BBC World Service             | 6195as  |          |
| 0300 | 0400 |          | UK, BBC World Service             | 3255af  | 6005me   |
|      |      |          | 6145af 6190af                     | 7130af  | 7160af   |
|      |      |          | 9410as 9750af                     | 11760as | 15320as  |
|      |      |          | 15360as 17760as                   | 17790as | 21660as  |
| 0300 | 0400 |          | USA, American Forces Radio        | 4319usb | 5446usb  |
|      |      |          | 5765usb 6350usb                   | 7811usb | 10320usb |
|      |      |          | 12133usb 13362usb                 |         |          |
| 0300 | 0400 |          | USA, KAIJ Dallas TX               | 5755na  |          |
| 0300 | 0400 |          | USA, KTVN Salt Lake City UT       | 7505na  |          |
| 0300 | 0400 |          | USA, KWHR Naalehu HI              | 17655as |          |
| 0300 | 0400 |          | USA, Voice of America             | 4930af  | 6080af   |
|      |      |          | 15580af                           |         |          |
| 0300 | 0400 |          | USA, WBCQ Kennebunk ME            | 5110na  | 7415na   |
| 0300 | 0400 |          | USA, WBOH Newport NC              | 5920am  |          |
| 0300 | 0400 |          | USA, WEWN Birmingham AL           | 5810va  |          |
| 0300 | 0400 |          | USA, WHRA Greenbush ME            | 5850na  |          |
| 0300 | 0400 |          | USA, WHRI Cypress Creek SC        | 5860am  | 6110am   |
|      |      |          | 7520am                            |         |          |
| 0300 | 0400 | sm       | USA, WHRI Cypress Creek SC        | 7315am  |          |
| 0300 | 0400 |          | USA, WINB Red Lion PA             | 9265am  |          |
| 0300 | 0400 | twhf     | USA, WRMI Miami FL                | 7385na  |          |
| 0300 | 0400 | sm       | USA, WRMI Miami FL                | 9955am  |          |
| 0300 | 0400 |          | USA, WTJC Newport NC              | 9370na  |          |
| 0300 | 0400 |          | USA, WWCN Nashville TN            | 3215na  | 5070na   |
|      |      |          | 5765na 5935na                     |         |          |
| 0300 | 0400 |          | USA, WWRB Manchester TN           | 6890na  |          |
| 0300 | 0400 |          | USA, WYFR/Family R Okeechobee FL  | 5985am  | 6065na   |
|      |      |          | 9505na 9985am                     | 11740am |          |
| 0300 | 0400 |          | Uzbekistan, Christian Vision      | 13685as |          |
| 0300 | 0400 | vl       | Zambia, Christian Voice           | 4965af  |          |
| 0300 | 0400 | vl/mtwhf | Zimbabwe, ZBC Corp                | 5975do  |          |
| 0300 | 0500 | t        | UK, Sudan Radio Service           | 7120af  |          |
| 0315 | 0330 | t        | Ecuador, HCJB                     | 9745va  |          |
| 0330 | 0345 | t        | Ecuador, HCJB                     | 6065va  |          |
| 0330 | 0358 |          | Hungary, Radio Budapest           |         | 6035na   |
| 0330 | 0358 |          | Vietnam, Voice of                 | 6175am  |          |
| 0330 | 0400 |          | Sweden, Radio                     | 6010na  |          |
| 0330 | 0400 |          | UK, BBC World Service             | 11665af |          |
| 0330 | 0400 | twhf     | USA, WBCQ Kennebunk ME            | 9330na  |          |
| 0345 | 0400 | twhf     | Albania, Radio Tirana             | 6115eu  | 7465eu   |

## 0400 UTC - 11PM EST / 10PM CST / 8PM PST

|      |      |                                 |                           |         |
|------|------|---------------------------------|---------------------------|---------|
| 0400 | 0427 | Czech Rep, Radio Prague         | 5990na                    | 6200na  |
|      |      | 7345na                          |                           |         |
| 0400 | 0430 | Australia, Radio 9660as 12080as | 13670as                   |         |
|      |      | 15240pa 15515as                 | 17750va                   | 21725va |
| 0400 | 0430 | France, Radio France Intl       | 7270af                    | 7315af  |
|      |      | 9805af                          |                           |         |
| 0400 | 0447 | Germany, Deutsche Welle         | 7225af                    |         |
| 0400 | 0456 | Romania, Radio Romania Intl     | 6115va                    | 9515na  |
|      |      | 9690va 11895va                  |                           |         |
| 0400 | 0500 | Anguilla, University Network    | 6090am                    |         |
| 0400 | 0500 | Australia, ABC NT Alice Springs | 4835do                    | 2310do  |
| 0400 | 0500 | Australia, ABC NT Katherine     | 5025do                    |         |
| 0400 | 0500 | Australia, ABC NT Tennant Creek | 4910do                    |         |
| 0400 | 0500 | Australia, CVC International    | 15515as                   |         |
| 0400 | 0500 | twhf                            | Canada, CBC NQ SW Service | 9625na  |



|      |      |        |                                   |          |          |
|------|------|--------|-----------------------------------|----------|----------|
| 0400 | 0500 |        | Canada, CFRX Toronto ON           | 6070na   |          |
| 0400 | 0500 |        | Canada, CKZN St John's NF         | 6160na   |          |
| 0400 | 0500 |        | Canada, CKZU Vancouver BC         | 6160na   |          |
| 0400 | 0500 |        | China, China Radio Intl           | 6190na   | 9460as   |
|      |      |        | 13620as                           | 15120as  | 17725as  |
| 0400 | 0500 |        | Costa Rica, University Network    | 5030va   | 6150va   |
|      |      |        | 7375va                            | 9725va   |          |
| 0400 | 0500 |        | Cuba, Radio Havana                | 6000na   | 6060na   |
|      |      |        | 6180na                            |          |          |
| 0400 | 0500 |        | Germany, Deutsche Welle           | 5905af   | 6180af   |
|      |      |        | 9565af                            | 15445af  |          |
| 0400 | 0500 |        | Guyana, Voice of                  | 3291do   |          |
| 0400 | 0500 |        | Malaysia, RTM/Trax FM             | 7295as   |          |
| 0400 | 0500 |        | Malaysia, RTM/Voice of Malaysia   |          | 6175as   |
|      |      |        | 9750as                            | 15295as  |          |
| 0400 | 0500 | vl     | Namibia, Namibian BC Corp         | 3270do   | 3290do   |
|      |      |        | 6060do                            | 6175do   |          |
| 0400 | 0500 |        | New Zealand, Radio NZ Intl        | 15720pa  |          |
| 0400 | 0500 | DRM    | New Zealand, Radio NZ Intl        | 17675pa  |          |
| 0400 | 0500 |        | Nigeria, Radio/Kaduna             | 6090do   |          |
| 0400 | 0500 | vl     | Papua New Guinea, Wantok R. Light |          | 7120va   |
| 0400 | 0500 |        | Russia, Voice of                  | 7150na   | 7255na   |
|      |      |        | 9840na                            | 12030na  | 13655na  |
| 0400 | 0500 | vl     | Rwanda, Radio                     | 6055do   |          |
| 0400 | 0500 |        | Singapore, MediaCorp Radio        | 6150do   |          |
| 0400 | 0500 |        | South Africa, Channel Africa      | 3345af   |          |
| 0400 | 0500 |        | Turkey, Voice of                  | 6020na   | 7240as   |
| 0400 | 0500 | vl     | Uganda, Radio                     | 4976do   | 5026do   |
| 0400 | 0500 |        | UK, BBC World Service             | 3255af   | 6005af   |
|      |      |        | 6190af                            | 6195eu   | 7120af   |
|      |      |        | 11665af                           | 11760as  | 12095af  |
|      |      |        | 15360as                           | 15575as  | 17760as  |
|      |      |        | 21660as                           |          | 17790as  |
| 0400 | 0500 | DRM    | UK, BBC World Service             | 6010na   |          |
| 0400 | 0500 |        | Ukraine, Radio Ukraine Intl       | 6150na   | 9515as   |
| 0400 | 0500 |        | USA, American Forces Radio        | 4319usb  | 5446usb  |
|      |      |        | 5765usb                           | 6350usb  | 7811usb  |
|      |      |        | 12133usb                          | 13362usb | 10320usb |
| 0400 | 0500 |        | USA, KAIJ Dallas TX               | 5755na   |          |
| 0400 | 0500 |        | USA, KLTN Salt Lake City UT       | 7505na   |          |
| 0400 | 0500 |        | USA, KWHR Naalehu HI              | 17655as  |          |
| 0400 | 0500 |        | USA, Voice of America             | 4930af   | 4960af   |
|      |      |        | 6080af                            | 9885af   | 15580af  |
| 0400 | 0500 |        | USA, WBCQ Kennebunk ME            | 5110na   | 7415na   |
| 0400 | 0500 |        | USA, WBOH Newport NC              | 5920am   |          |
| 0400 | 0500 |        | USA, WEWN Birmingham AL           | 5810va   | 5850va   |
| 0400 | 0500 |        | USA, WHRA Greenbush ME            | 5850na   |          |
| 0400 | 0500 |        | USA, WHRI Cypress Creek SC        | 5860am   | 7490am   |
| 0400 | 0500 | sm     | USA, WHRI Cypress Creek SC        | 7315am   |          |
| 0400 | 0500 |        | USA, WMLK Bethel PA               | 9265eu   |          |
| 0400 | 0500 | thwhfa | USA, WRMI Miami FL                | 7385na   |          |
| 0400 | 0500 | sm     | USA, WRMI Miami FL                | 9955am   |          |
| 0400 | 0500 |        | USA, WTJC Newport NC              | 9370na   |          |
| 0400 | 0500 |        | USA, WWCR Nashville TN            | 3215na   | 5070na   |
|      |      |        | 5765na                            | 5935na   |          |
| 0400 | 0500 |        | USA, WWRB Manchester TN           | 6890na   |          |
| 0400 | 0500 |        | USA, WYFR/Family R Okeechobee FL  | 6065na   |          |
|      |      |        | 6855na                            | 7780va   | 9505na   |
| 0400 | 0500 |        | Uzbekistan, Christian Vision      | 13685as  |          |
| 0400 | 0500 |        | Zambia, Christian Voice           | 4965af   | 6065af   |
| 0400 | 0500 | vl     | Zimbabwe, ZBC Corp                | 5975do   |          |
| 0430 | 0445 |        | Israel, Kol Israel                | 6280va   | 7545va   |
| 0430 | 0457 |        | Czech Rep, Radio Prague           | 9890na   | 17600va  |
| 0430 | 0500 |        | Australia, Radio                  | 9600as   | 12080as  |
|      |      |        | 15240pa                           | 15415as  | 15515va  |
|      |      |        | 21725va                           |          | 17750va  |
| 0430 | 0500 |        | Nigeria, Radio/Ibadan             | 6050do   |          |
| 0430 | 0500 |        | Nigeria, Radio/Kaduna             | 4770do   |          |
| 0430 | 0500 |        | Nigeria, Radio/Lagos              | 3326do   | 4990do   |
| 0430 | 0500 |        | Swaziland, TWR                    | 3200af   | 4775af   |
| 0445 | 0500 |        | Italy, RAI Intl                   | 5965af   | 6120af   |
|      |      |        |                                   |          | 7170af   |

### 0500 UTC - 12AM EST / 11PM CST / 9PM PST

|      |      |         |                                 |         |         |
|------|------|---------|---------------------------------|---------|---------|
| 0500 | 0507 | thwhfas | Canada, CBC NQ SW Service       | 9625na  |         |
| 0500 | 0530 | mtwhf   | France, Radio France Intl       | 9805af  | 11995af |
|      |      |         | 13680af                         |         |         |
| 0500 | 0530 |         | Germany, Deutsche Welle         | 6180af  | 7285af  |
|      |      |         | 9755af                          | 12045af | 15410af |
| 0500 | 0530 | vl      | Rwanda, Radio                   | 6055do  |         |
| 0500 | 0530 |         | Vatican City, Vatican Radio     | 7360af  | 9660af  |
|      |      |         | 11625af                         |         |         |
| 0500 | 0555 |         | South Africa, Channel Africa    | 7240af  | 9685af  |
| 0500 | 0557 |         | Netherlands, Radio              | 6165na  |         |
| 0500 | 0559 |         | New Zealand, Radio NZ Intl      | 15720pa |         |
| 0500 | 0559 | DRM     | New Zealand, Radio NZ Intl      | 17675pa |         |
| 0500 | 0600 |         | Anguilla, University Network    | 6090am  |         |
| 0500 | 0600 |         | Australia, ABC NT Alice Springs |         | 2310do  |
|      |      |         | 4835do                          |         |         |
| 0500 | 0600 |         | Australia, ABC NT Katherine     | 5025do  |         |
| 0500 | 0600 |         | Australia, ABC NT Tennant Creek |         | 4910do  |
| 0500 | 0600 |         | Australia, CVC International    | 15515as |         |

|      |      |           |                                   |          |         |          |
|------|------|-----------|-----------------------------------|----------|---------|----------|
| 0500 | 0600 |           | Australia, Radio                  | 9660as   | 12080as | 13670as  |
|      |      |           | 15160as                           | 15240pa  | 15515as | 17750va  |
| 0500 | 0600 |           | Bhutan, BBS                       | 6035as   |         |          |
| 0500 | 0600 |           | Canada, CFRX Toronto ON           | 6070na   |         |          |
| 0500 | 0600 |           | Canada, CKZN St John's NF         | 6160na   |         |          |
| 0500 | 0600 |           | Canada, CKZU Vancouver BC         | 6160na   |         |          |
| 0500 | 0600 |           | China, China Radio Intl           | 5960na   | 6190na  |          |
|      |      |           | 7220af                            | 11880as  | 15350as | 15465as  |
|      |      |           | 17505va                           | 17540as  | 17725as | 17855as  |
| 0500 | 0600 |           | Costa Rica, University Network    | 5030va   | 6150va  |          |
|      |      |           | 7375va                            | 9725va   |         |          |
| 0500 | 0600 |           | Cuba, Radio Havana                | 6000na   | 6060na  |          |
|      |      |           | 6180na                            | 9550va   | 11760va |          |
| 0500 | 0600 |           | Germany, CVC The Voice Africa     |          | 9555af  |          |
| 0500 | 0600 |           | Guyana, Voice of                  | 3291do   |         |          |
| 0500 | 0600 |           | Japan, Radio Japan/NHK World      |          | 5975eu  |          |
|      |      |           | 6110na                            | 7230eu   | 15195as | 17810as  |
|      |      |           | 21755pa                           |          |         |          |
| 0500 | 0600 |           | Malaysia, RTM/Trax FM             | 7295as   |         |          |
| 0500 | 0600 |           | Malaysia, RTM/Voice of Malaysia   |          | 6175as  |          |
|      |      |           | 9750as                            | 15295as  |         |          |
| 0500 | 0600 | vl        | Namibia, Namibian BC Corp         | 3270do   | 3290do  |          |
|      |      |           | 6060do                            | 6175do   |         |          |
| 0500 | 0600 |           | Nigeria, Radio/Ibadan             | 6050do   |         |          |
| 0500 | 0600 |           | Nigeria, Radio/Kaduna             | 4770do   | 6090do  |          |
| 0500 | 0600 |           | Nigeria, Radio/Lagos              | 3326do   | 4990do  |          |
| 0500 | 0600 |           | Nigeria, Voice of                 | 15120af  |         |          |
| 0500 | 0600 | vl        | Papua New Guinea, Wantok R. Light |          | 7120va  |          |
| 0500 | 0600 |           | Russia, Voice of                  | 7150na   | 7255na  | 7350na   |
|      |      |           | 9840na                            | 13665na  |         |          |
| 0500 | 0600 |           | Singapore, MediaCorp Radio        | 6150do   |         |          |
| 0500 | 0600 |           | Swaziland, TWR                    | 4775af   | 6120af  | 9500af   |
| 0500 | 0600 | vl        | Uganda, Radio                     | 4976do   | 5026do  |          |
| 0500 | 0600 | DRM       | UK, BBC World Service             | 1296eu   |         |          |
| 0500 | 0600 |           | UK, BBC World Service             | 3255af   | 6005as  |          |
|      |      |           | 6190af                            | 6195af   | 9410eu  |          |
|      |      |           | 9440eu                            | 11665af  | 11695as | 11760as  |
|      |      |           | 11765af                           | 11955as  | 12095eu | 15310as  |
|      |      |           | 15575as                           | 17640af  | 17760as | 17790as  |
| 0500 | 0600 | mtwhf     | UK, BBC World Service             | 15420af  |         |          |
| 0500 | 0600 | vl/ mtwhf | UK, Sudan Radio Service           | 9525af   |         |          |
| 0500 | 0600 |           | USA, American Forces Radio        | 4319usb  | 5446usb |          |
|      |      |           | 5765usb                           | 6350usb  | 7811usb | 10320usb |
|      |      |           | 12133usb                          | 13362usb |         |          |
| 0500 | 0600 |           | USA, KAIJ Dallas TX               | 5755na   |         |          |
| 0500 | 0600 |           | USA, KLTN Salt Lake City UT       | 7505na   |         |          |
| 0500 | 0600 |           | USA, KWHR Naalehu HI              | 11565as  | 13650as |          |
| 0500 | 0600 |           | USA, Voice of America             | 4930af   | 6080af  |          |
|      |      |           | 9885af                            | 15580af  |         |          |
| 0500 | 0600 |           | USA, WBCQ Kennebunk ME            | 5110na   | 7415na  |          |
| 0500 | 0600 |           | USA, WBOH Newport NC              | 5920am   |         |          |
| 0500 | 0600 |           | USA, WEWN Birmingham AL           | 5850va   | 7570va  |          |
| 0500 | 0600 |           | USA, WHRA Greenbush ME            | 7555na   |         |          |
| 0500 | 0600 |           | USA, WHRI Cypress Creek SC        | 5860am   | 7490am  |          |
| 0500 | 0600 | sm        | USA, WHRI Cypress Creek SC        | 7315am   |         |          |
| 0500 | 0600 |           | USA, WMLK Bethel PA               | 9265eu   |         |          |
| 0500 | 0600 |           | USA, WRMI Miami FL                | 9955am   |         |          |
| 0500 | 0600 |           | USA, WTJC Newport NC              | 9370na   |         |          |
| 0500 | 0600 |           | USA, WWCR Nashville TN            | 3215na   | 5070na  |          |
|      |      |           | 5765na                            | 5935na   |         |          |
| 0500 | 0600 |           | USA, WWRB Manchester TN           | 3185na   | 5085na  |          |
| 0500 | 0600 |           | USA, WYFR/Family R Okeechobee FL  | 6855na   |         |          |
|      |      |           | 7520va                            |          |         |          |
| 0500 | 0600 |           | Uzbekistan, Christian Vision      | 13685as  |         |          |
| 0500 | 0600 |           | Zambia, Christian Voice           | 4965af   | 6065af  |          |
| 0500 | 0600 | vl        | Zimbabwe, ZBC Corp                | 5975do   |         |          |
| 0525 | 0600 | vl        | Ghana, Ghana BC Corp              | 3366do   | 4915do  |          |
| 0530 | 0600 |           | Thailand, Radio                   | 13770eu  |         |          |
| 0545 | 0600 | vl        | Rwanda, Radio                     | 6055do   |         |          |

### 0600 UTC - 1AM EST / 12AM CST / 10PM PST

|      |      |       |                                 |         |         |         |
|------|------|-------|---------------------------------|---------|---------|---------|
| 0600 | 0615 | as    | South Africa, TWR               | 11640af |         |         |
| 0600 | 0620 |       | Vatican City, Vatican Radio     |         | 4005eu  | 7250eu  |
| 0600 | 0630 |       | Australia, Radio                | 9660as  | 12080as | 13670as |
|      |      |       | 15160as                         | 15240pa | 15515as | 17750va |
| 0600 | 0630 | mtwhf | France, Radio France Intl       |         | 7315af  | 9865af  |
|      |      |       | 11995af                         | 13680af | 15160af | 17770af |
| 0600 | 0630 |       | Germany, Deutsche Welle         |         | 7240af  | 7285af  |
|      |      |       | 9565af                          | 12045af |         |         |
| 0600 | 0630 |       | USA, Voice of America           |         | 6080af  | 6105af  |
|      |      |       | 9885af                          | 15580af |         |         |
| 0600 | 0645 | mtwhf | South Africa, TWR               | 11640af |         |         |
| 0600 | 0700 |       | Anguilla, University Network    |         | 6090am  |         |
| 0600 | 0700 |       | Australia, ABC NT Alice Springs |         |         | 2310do  |
|      |      |       | 4835do                          |         |         |         |
| 0600 | 0700 |       | Australia, ABC NT Katherine     | 5025do  |         |         |
| 0600 | 0700 |       | Australia, ABC NT Tennant Creek |         |         | 4910do  |
| 0600 | 0700 |       | Australia, CVC International    | 15515as |         | 15335as |
| 0600 | 0700 |       | Canada, CFRX Toronto ON         | 6070na  |         |         |
| 0600 | 0700 |       | Canada, CFVP Calgary AB         | 6030na  |         |         |
| 0600 | 0700 |       | Canada, CKZN St John's NF       | 6160na  |         |         |

|      |      |                                   |          |          |
|------|------|-----------------------------------|----------|----------|
| 0600 | 0700 | Canada, CKZU Vancouver BC         | 6160na   |          |
| 0600 | 0700 | China, China Radio Intl           | 6115na   | 11750af  |
|      |      | 11770as                           | 11880as  | 13645as  |
|      |      | 15350as                           | 15465as  | 17505va  |
|      |      | 17710as                           |          | 17540as  |
| 0600 | 0700 | Costa Rica, University Network    | 5030va   | 6150va   |
|      |      | 7375va                            | 9725va   | 11870va  |
| 0600 | 0700 | Cuba, Radio Havana                | 6000va   | 6060va   |
|      |      | 6180na                            | 9550va   | 11760va  |
| 0600 | 0700 | Germany, CVC The Voice Africa     |          | 9555af   |
| 0600 | 0700 | Germany, Deutsche Welle           | 6140eu   |          |
| 0600 | 0700 | Ghana, Ghana BC Corp              | 3366do   | 4915do   |
| 0600 | 0700 | Guyana, Voice of                  | 3291do   |          |
| 0600 | 0700 | Japan, Radio Japan/NHK World      |          | 7230eu   |
|      |      | 11690va                           | 11715eu  | 11740as  |
| 0600 | 0700 | Liberia, ELWA                     | 4760do   | 17870pa  |
| 0600 | 0700 | Malaysia, RTM/Trax FM             | 7295as   |          |
| 0600 | 0700 | Malaysia, RTM/Voice of Malaysia   |          | 6175as   |
|      |      | 9750as                            | 15295as  |          |
| 0600 | 0700 | Namibia, Namibian BC Corp         | 3270do   | 3290do   |
|      |      | 6060do                            | 6175do   |          |
| 0600 | 0700 | New Zealand, Radio NZ Intl        | 9765pa   |          |
| 0600 | 0700 | New Zealand, Radio NZ Intl        | 9890pa   |          |
| 0600 | 0700 | Nigeria, Radio/Ibadan             | 6050do   |          |
| 0600 | 0700 | Nigeria, Radio/Kaduna             | 4770do   | 6090do   |
| 0600 | 0700 | Nigeria, Radio/Lagos              | 3326do   | 4990do   |
| 0600 | 0700 | Nigeria, Voice of                 | 15120af  |          |
| 0600 | 0700 | Papua New Guinea, Wantok R. Light |          | 7120va   |
| 0600 | 0700 | Russia, Voice of                  | 11575eu  | 17665oc  |
| 0600 | 0700 | Sierra Leone, SLBS 3316do         |          | 17805oc  |
| 0600 | 0700 | Singapore, MediaCorp Radio        | 6150do   |          |
| 0600 | 0700 | Solomon Islands, SIBC             | 5020do   | 9545do   |
| 0600 | 0700 | South Africa, Channel Africa      | 7240af   | 15255af  |
| 0600 | 0700 | Swaziland, TWR                    | 4775af   | 9500af   |
| 0600 | 0700 | UK, BBC World Service             | 1296eu   |          |
| 0600 | 0700 | UK, BBC World Service             | 6005af   | 6190af   |
|      |      | 6195eu                            | 7160eu   | 9410eu   |
|      |      | 11940af                           | 12095eu  | 11765af  |
|      |      | 15360as                           | 15420af  | 11955as  |
|      |      | 17760as                           | 17790as  | 17640af  |
| 0600 | 0700 | USA, American Forces Radio        | 4319usb  | 5446usb  |
|      |      | 5765usb                           | 6350usb  | 7811usb  |
|      |      | 12133usb                          | 13362usb | 10320usb |
| 0600 | 0700 | USA, KALJ Dallas TX               | 5755na   |          |
| 0600 | 0700 | USA, KLTN Salt Lake City UT       | 7505na   |          |
| 0600 | 0700 | USA, KWHR Naalehu HI              | 11565as  | 13650as  |
| 0600 | 0700 | USA, WBCQ Kennebunk ME            | 5110na   | 7415na   |
| 0600 | 0700 | USA, WBOH Newport NC              | 5920am   |          |
| 0600 | 0700 | USA, WEWN Birmingham AL           | 5850va   | 7570va   |
| 0600 | 0700 | USA, WHRA Greenbush ME            | 7555na   |          |
| 0600 | 0700 | USA, WHRI Cypress Creek SC        | 5860am   |          |
| 0600 | 0700 | USA, WHRI Cypress Creek SC        | 7315am   | 7490am   |
| 0600 | 0700 | USA, WMLK Bethel PA               | 9265eu   |          |
| 0600 | 0700 | USA, WRMI Miami FL                | 9955am   |          |
| 0600 | 0700 | USA, WTJC Newport NC              | 9370na   |          |
| 0600 | 0700 | USA, WWCR Nashville TN            | 3215na   | 5070na   |
|      |      | 5765na                            | 5935na   |          |
| 0600 | 0700 | USA, WWRB Manchester TN           | 3185na   | 5085na   |
| 0600 | 0700 | USA, WYFR/Family R Okeechobee FL  | 5945am   |          |
|      |      | 6000am                            | 7780va   | 9860na   |
|      |      | 11630va                           |          | 11580af  |
| 0600 | 0700 | Uzbekistan, Christian Vision      | 13685as  |          |
| 0600 | 0700 | Vanuatu, Radio                    | 4960do   |          |
| 0600 | 0700 | Yemen, Rep of Yemen Radio         | 9780me   |          |
| 0600 | 0700 | Zambia, Christian Voice           | 6065af   |          |
| 0600 | 0700 | Zimbabwe, ZBC Corp                | 5975do   |          |
| 0605 | 0620 | Austria, Radio Austria Intl       | 17870me  |          |
| 0605 | 0630 | Austria, Radio Austria Intl       | 17870me  |          |
| 0630 | 0656 | Romania, Radio Romania Intl       | 7180va   | 9690va   |
|      |      | 15135va                           | 17780va  |          |
| 0630 | 0700 | Australia, Radio                  | 9660as   | 12080as  |
|      |      | 15160as                           | 15240pa  | 15415as  |
|      |      | 17750va                           |          |          |
| 0630 | 0700 | UK, BBC World Service             | 11795af  |          |
| 0630 | 0700 | USA, Voice of America             | 6080af   | 9885af   |
|      |      | 15580af                           |          |          |
| 0630 | 0700 | Vatican City, Vatican Radio       | 7360af   | 9660af   |
|      |      | 11625af                           |          |          |
| 0635 | 0700 | Austria, Radio Austria Intl       | 17870me  |          |
| 0645 | 0700 | Austria, Radio Austria Intl       | 17870me  |          |

## 0700 UTC - 2AM EST / 1AM CST / 11PM PST

|      |      |                                 |         |         |
|------|------|---------------------------------|---------|---------|
| 0700 | 0705 | Croatia, Croatian Radio         | 9470oc  | 11690oc |
| 0700 | 0706 | UK, BBC World Service           | 6005af  |         |
| 0700 | 0730 | Australia, CVC International    | 15515as |         |
| 0700 | 0730 | France, Radio France Intl       | 11725af | 15605af |
| 0700 | 0730 | Slovakia, Radio Slovakia Int    | 13715oc | 15460oc |
| 0700 | 0757 | Netherlands, Radio              | 7300eu  |         |
| 0700 | 0800 | Anguilla, University Network    | 6090am  |         |
| 0700 | 0800 | Australia, ABC NT Alice Springs |         | 2310do  |
|      |      | 4835do                          |         |         |

|      |      |                                   |          |          |
|------|------|-----------------------------------|----------|----------|
| 0700 | 0800 | Australia, ABC NT Katherine       | 5025do   |          |
| 0700 | 0800 | Australia, ABC NT Tennant Creek   |          | 4910do   |
| 0700 | 0800 | Australia, CVC International      | 15335as  |          |
| 0700 | 0800 | Australia, Radio                  | 9660as   | 9710as   |
|      |      | 13630as                           | 15160pa  | 15240pa  |
|      |      | 17750va                           |          | 15415as  |
| 0700 | 0800 | Canada, CFRX Toronto ON           | 6070na   |          |
| 0700 | 0800 | Canada, CFVP Calgary AB           | 6030na   |          |
| 0700 | 0800 | Canada, CKZN St John's NF         | 6160na   |          |
| 0700 | 0800 | Canada, CKZU Vancouver BC         | 6160na   |          |
| 0700 | 0800 | China, China Radio Intl           | 11785eu  | 11880as  |
|      |      | 13645as                           | 15465as  | 17490eu  |
|      |      | 17790as                           |          | 17540as  |
| 0700 | 0800 | Costa Rica, University Network    | 5030va   | 6150va   |
|      |      | 7375va                            | 9725va   | 11870va  |
| 0700 | 0800 | Germany, CVC The Voice Africa     |          | 9555af   |
| 0700 | 0800 | Germany, CVC The Voice Africa     |          | 9555af   |
| 0700 | 0800 | Germany, Deutsche Welle           | 6140eu   |          |
| 0700 | 0800 | Ghana, Ghana BC Corp              | 3366do   | 4915do   |
| 0700 | 0800 | Greece, Voice of                  | 12105eu  | 15630eu  |
| 0700 | 0800 | Guyana, Voice of                  | 3291do   | 5950do   |
| 0700 | 0800 | Liberia, ELWA                     | 4760do   |          |
| 0700 | 0800 | Liberia, Star Radio               | 9525af   |          |
| 0700 | 0800 | Malaysia, RTM/Trax FM             | 7295as   |          |
| 0700 | 0800 | Malaysia, RTM/Voice of Malaysia   |          | 6175as   |
|      |      | 9750as                            | 15295as  |          |
| 0700 | 0800 | Myanmar, Radio                    | 9730do   |          |
| 0700 | 0800 | Namibia, Namibian BC Corp         | 3270do   | 3290do   |
|      |      | 6060do                            | 6175do   |          |
| 0700 | 0800 | New Zealand, Radio NZ Intl        | 9765pa   |          |
| 0700 | 0800 | New Zealand, Radio NZ Intl        | 9890pa   |          |
| 0700 | 0800 | Nigeria, Radio/Ibadan             | 6050do   |          |
| 0700 | 0800 | Nigeria, Radio/Kaduna             | 4770do   | 6090do   |
| 0700 | 0800 | Nigeria, Radio/Lagos              | 3326do   | 4990do   |
| 0700 | 0800 | Papua New Guinea, Wantok R. Light |          | 7120va   |
| 0700 | 0800 | Russia, Voice of                  | 17665oc  | 17805oc  |
| 0700 | 0800 | Russia, Voice of                  | 11635eu  |          |
| 0700 | 0800 | Sierra Leone, SLBS 3316do         |          |          |
| 0700 | 0800 | Singapore, MediaCorp Radio        | 6150do   |          |
| 0700 | 0800 | Solomon Islands, SIBC             | 5020do   | 9545do   |
| 0700 | 0800 | South Africa, Channel Africa      | 9620af   |          |
| 0700 | 0800 | Swaziland, TWR                    | 4775af   |          |
| 0700 | 0800 | Swaziland, TWR                    | 6120af   | 9500af   |
| 0700 | 0800 | Taiwan, Radio Taiwan Intl         | 5950na   |          |
| 0700 | 0800 | UK, BBC World Service             | 1296eu   |          |
| 0700 | 0800 | UK, BBC World Service             | 15400af  |          |
| 0700 | 0800 | UK, BBC World Service             | 5875eu   | 6190af   |
|      |      | 6195eu                            | 7320eu   | 9410eu   |
|      |      | 11760me                           | 11765af  | 11795eu  |
|      |      | 11955as                           | 12095eu  | 11940af  |
|      |      | 15575as                           | 17790as  | 15360as  |
| 0700 | 0800 | USA, American Forces Radio        | 4319usb  | 5446usb  |
|      |      | 5765usb                           | 6350usb  | 7811usb  |
|      |      | 12133usb                          | 13362usb | 10320usb |
| 0700 | 0800 | USA, KALJ Dallas TX               | 5755na   |          |
| 0700 | 0800 | USA, KLTN Salt Lake City UT       | 7505na   |          |
| 0700 | 0800 | USA, KWHR Naalehu HI              | 11565as  | 13650as  |
| 0700 | 0800 | USA, WBCQ Kennebunk ME            | 5110na   | 7415na   |
| 0700 | 0800 | USA, WBOH Newport NC              | 5920am   |          |
| 0700 | 0800 | USA, WEWN Birmingham AL           | 5850va   | 7570va   |
| 0700 | 0800 | USA, WHRA Greenbush ME            | 7465na   |          |
| 0700 | 0800 | USA, WHRI Cypress Creek SC        | 5860am   |          |
| 0700 | 0800 | USA, WHRI Cypress Creek SC        | 7315am   | 7490am   |
| 0700 | 0800 | USA, WMLK Bethel PA               | 9265eu   |          |
| 0700 | 0800 | USA, WRMI Miami FL                | 9955am   |          |
| 0700 | 0800 | USA, WTJC Newport NC              | 9370na   |          |
| 0700 | 0800 | USA, WWCR Nashville TN            | 3215na   | 5070na   |
|      |      | 5765na                            | 5935na   |          |
| 0700 | 0800 | USA, WWRB Manchester TN           | 3185na   | 5085na   |
| 0700 | 0800 | USA, WYFR/Family R Okeechobee FL  | 6855na   |          |
|      |      | 7455na                            | 7780va   | 9495am   |
|      |      | 9985af                            |          | 9715na   |
| 0700 | 0800 | Vanuatu, Radio                    | 4960do   |          |
| 0700 | 0800 | Zambia, Christian Voice           | 6065af   |          |
| 0730 | 0745 | Vatican City, Vatican Radio       | 4005eu   | 6185eu   |
|      |      | 7250eu                            | 9645eu   | 11740eu  |
| 0730 | 0800 | Australia, HCJB                   | 11750pa  |          |
| 0730 | 0800 | Bulgaria, Radio                   | 9500eu   | 11900eu  |
| 0730 | 0800 | Pakistan, Radio                   | 15100eu  | 17835eu  |
| 0745 | 0800 | Albania, TWR Europe               | 11865eu  |          |
| 0745 | 0800 | Monaco, TWR Europe                | 9800eu   |          |

## 0800 UTC - 3AM EST / 2AM CST / 12AM PST

|      |      |                                 |         |         |
|------|------|---------------------------------|---------|---------|
| 0800 | 0825 | Malaysia, RTM/Voice of Malaysia | 6175as  |         |
|      |      | 9750as                          | 15295as |         |
| 0800 | 0827 | Czech Rep, Radio Prague         | 7345eu  | 9860eu  |
| 0800 | 0830 | Australia, ABC NT Katherine     | 5025do  |         |
| 0800 | 0830 | Australia, ABC NT Tennant Creek |         | 4910do  |
| 0800 | 0830 | Liberia, ELWA                   | 4760do  |         |
| 0800 | 0830 | Myanmar, Radio                  | 9730do  |         |
| 0800 | 0830 | Pakistan, Radio                 | 15100eu | 17835eu |



|      |      |           |                                   |          |          |
|------|------|-----------|-----------------------------------|----------|----------|
| 0800 | 0845 | a         | Guam, TWR/KTWR 11840pa            |          |          |
| 0800 | 0900 | smtwhf    | Albania, TWR Europe               | 11865eu  |          |
| 0800 | 0900 |           | Anguilla, University Network      | 6090am   |          |
| 0800 | 0900 |           | Australia, ABC NT Alice Springs   | 2310do   |          |
|      |      |           | 4835do                            |          |          |
| 0800 | 0900 |           | Australia, CVC International      | 15335as  |          |
| 0800 | 0900 | mtwhfa    | Australia, HCJB                   | 11750pa  |          |
| 0800 | 0900 |           | Australia, Radio                  | 5995va   | 9710va   |
|      |      |           | 12080as                           | 13630va  | 15415as  |
|      |      |           |                                   |          | 17750va  |
| 0800 | 0900 |           | Canada, CFRX Toronto ON           | 6070na   |          |
| 0800 | 0900 |           | Canada, CFVP Calgary AB           | 6030na   |          |
| 0800 | 0900 |           | Canada, CKZN St John's NF         | 6160na   |          |
| 0800 | 0900 |           | Canada, CKZU Vancouver BC         | 6160na   |          |
| 0800 | 0900 |           | China, China Radio Intl           | 9415as   | 11785eu  |
|      |      |           | 11880as                           | 15350as  | 15465as  |
|      |      |           | 17540as                           |          | 17490eu  |
| 0800 | 0900 |           | Costa Rica, University Network    | 5030va   | 6150va   |
|      |      |           | 7375va                            | 9725va   | 11870va  |
| 0800 | 0900 |           | Germany, CVC The Voice Africa     |          | 9555af   |
| 0800 | 0900 |           | Germany, Deutsche Welle           | 6140eu   |          |
| 0800 | 0900 | vi        | Ghana, Ghana BC Corp              | 3366do   | 4915do   |
| 0800 | 0900 | mtwhf     | Guam, TWR/KTWR 11840pa            |          |          |
| 0800 | 0900 |           | Guyana, Voice of                  | 3291do   | 5950do   |
| 0800 | 0900 |           | Indonesia, Voice of               | 9525as   | 11785pa  |
|      |      |           | 15150al                           |          |          |
| 0800 | 0900 |           | Liberia, Star Radio               | 9525af   |          |
| 0800 | 0900 |           | Malaysia, RTM/Trax FM             | 7295as   |          |
| 0800 | 0900 | s         | Monaco, TWR Europe                | 9800eu   |          |
| 0800 | 0900 | mtwhf     | Monaco, TWR Europe                | 9800eu   |          |
| 0800 | 0900 |           | New Zealand, Radio NZ Intl        | 9765pa   |          |
| 0800 | 0900 | DRM       | New Zealand, Radio NZ Intl        | 9890pa   |          |
| 0800 | 0900 |           | Nigeria, Radio/Ibadan             | 6050do   |          |
| 0800 | 0900 |           | Nigeria, Radio/Kaduna             | 4770do   | 6090do   |
| 0800 | 0900 |           | Nigeria, Radio/Lagos              | 3326do   | 4990do   |
| 0800 | 0900 |           | Papua New Guinea, Catholic Radio  |          | 4960do   |
| 0800 | 0900 |           | Papua New Guinea, NBC             | 4890do   |          |
| 0800 | 0900 | vi        | Papua New Guinea, Wantok R. Light | 7120va   |          |
| 0800 | 0900 |           | Russia, Voice of                  | 15195as  | 17495oc  |
|      |      |           | 17805oc                           |          | 17665oc  |
| 0800 | 0900 | irreg/ vi | Sierra Leone, SLBS 3316do         |          |          |
| 0800 | 0900 |           | Singapore, MediaCorp Radio        | 6150do   |          |
| 0800 | 0900 | vi        | Solomon Islands, SIBC             | 5020do   | 9545do   |
| 0800 | 0900 | vi        | South Africa, Channel Africa      | 9620af   |          |
| 0800 | 0900 |           | South Korea, KBS World Radio      | 9640eu   | 9570as   |
| 0800 | 0900 |           | Swaziland, TWR                    | 6120af   |          |
| 0800 | 0900 |           | Taiwan, Radio Taiwan Intl         | 9610as   |          |
| 0800 | 0900 | DRM       | UK, BBC World Service             | 1296eu   |          |
| 0800 | 0900 |           | UK, BBC World Service             | 5875eu   | 6190af   |
|      |      |           | 6195eu                            | 7320eu   | 9740as   |
|      |      |           | 11940af                           | 12095eu  | 15285as  |
|      |      |           | 17885af                           | 21470af  | 17790as  |
| 0800 | 0900 | mtwhf     | UK, BBC World Service             | 15400af  | 17830af  |
| 0800 | 0900 | Sat/Sun   | UK, BBC World Service             | 15575as  | 17830af  |
| 0800 | 0900 | f         | UK, Bible Voice                   | 5945eu   |          |
| 0800 | 0900 | a         | UK, Bible Voice                   | 5945eu   |          |
| 0800 | 0900 | s         | UK, Bible Voice                   | 5945eu   |          |
| 0800 | 0900 |           | USA, American Forces Radio        | 4319usb  | 5446usb  |
|      |      |           | 5765usb                           | 6350usb  | 7811usb  |
|      |      |           | 12133usb                          | 13362usb | 10320usb |
| 0800 | 0900 |           | USA, KAIJ Dallas TX               | 5755na   |          |
| 0800 | 0900 |           | USA, KNLS Anchor Point AK         | 6150as   |          |
| 0800 | 0900 |           | USA, KTNB Salt Lake City UT       | 7505na   |          |
| 0800 | 0900 |           | USA, KWHR Naalehu HI              | 9930as   | 11565as  |
| 0800 | 0900 |           | USA, WBOH Newport NC              | 5920am   |          |
| 0800 | 0900 |           | USA, WEWN Birmingham AL           | 5850na   |          |
| 0800 | 0900 |           | USA, WHRA Greenbush ME            | 7465na   |          |
| 0800 | 0900 | twhfa     | USA, WHRI Cypress Creek SC        | 5860am   |          |
| 0800 | 0900 |           | USA, WHRI Cypress Creek SC        | 7315     | an       |
|      |      |           | 7490am                            |          |          |
| 0800 | 0900 |           | USA, WMLK Bethel PA               | 9265eu   |          |
| 0800 | 0900 |           | USA, WRMI Miami FL                | 9955am   |          |
| 0800 | 0900 |           | USA, WTJC Newport NC              | 9370na   |          |
| 0800 | 0900 |           | USA, WWCR Nashville TN            | 3215na   | 5070na   |
|      |      |           | 5765na                            | 5935na   |          |
| 0800 | 0900 |           | USA, WWRB Manchester TN           | 3185na   | 5085na   |
| 0800 | 0900 |           | USA, WYFR/Family R Okeechobee FL  | 5950na   |          |
|      |      |           | 6855na                            | 7455na   |          |
| 0800 | 0900 | vi        | Vanuatu, Radio                    | 4960do   |          |
| 0800 | 0900 |           | Zambia, Christian Voice           | 6065af   |          |
| 0800 | 1000 | DRM       | Russia, Voice of                  | 12060eu  |          |
| 0805 | 0900 | mtwhf     | Guam, TWR/KTWR 15170as            |          |          |
| 0815 | 0850 | a         | Albania, TWR Europe               | 11865eu  |          |
| 0815 | 0850 | a         | Monaco, TWR Europe                | 9800eu   |          |
| 0830 | 0900 |           | Australia, ABC NT Katherine       | 2485do   |          |
| 0830 | 0900 |           | Australia, ABC NT Tennant Creek   |          | 2325do   |

#### 0900 UTC - 4AM EST / 3AM CST / 1AM PST

|      |      |    |                        |        |        |
|------|------|----|------------------------|--------|--------|
| 0900 | 0900 |    | USA, WBCQ Kennebunk ME | 5110na | 7415na |
| 0900 | 0915 | vi | Ghana, Ghana BC Corp   | 3366do | 4915do |
| 0900 | 0915 | s  | UK, Bible Voice        | 5945eu |        |

|      |      |           |                                   |          |          |
|------|------|-----------|-----------------------------------|----------|----------|
| 0900 | 0920 | smtwhf    | Albania, TWR Europe               | 11865eu  |          |
| 0900 | 0920 | s         | Monaco, TWR Europe                | 9800eu   |          |
| 0900 | 0920 | mtwhf     | Monaco, TWR Europe                | 9800eu   |          |
| 0900 | 0930 | mtwhfa    | Australia, HCJB                   | 11750pa  |          |
| 0900 | 0945 | s         | UK, Bible Voice                   | 5945eu   |          |
| 0900 | 1000 |           | Anguilla, University Network      | 6090am   |          |
| 0900 | 1000 |           | Australia, ABC NT Alice Springs   | 2310do   |          |
|      |      |           | 4835do                            |          |          |
| 0900 | 1000 |           | Australia, ABC NT Katherine       | 2485do   |          |
| 0900 | 1000 |           | Australia, ABC NT Tennant Creek   |          | 2325do   |
| 0900 | 1000 |           | Australia, CVC International      | 11955as  |          |
| 0900 | 1000 |           | Australia, Radio                  | 9580va   | 9590va   |
| 0900 | 1000 |           | Bhutan, BBS                       | 6035as   |          |
| 0900 | 1000 |           | Canada, CFRX Toronto ON           | 6070na   |          |
| 0900 | 1000 |           | Canada, CFVP Calgary AB           | 6030na   |          |
| 0900 | 1000 |           | Canada, CKZN St John's NF         | 6160na   |          |
| 0900 | 1000 |           | Canada, CKZU Vancouver BC         | 6160na   |          |
| 0900 | 1000 |           | China, China Radio Intl           | 9415as   | 15210as  |
|      |      |           | 15350as                           | 17490eu  | 17750as  |
| 0900 | 1000 |           | Costa Rica, University Network    | 5030va   | 6150va   |
|      |      |           | 7375va                            | 9725va   | 11870va  |
| 0900 | 1000 |           | Germany, CVC The Voice Africa     |          | 9555af   |
| 0900 | 1000 |           | Germany, Deutsche Welle           | 6140eu   | 17700as  |
|      |      |           | 21780eu                           |          |          |
| 0900 | 1000 |           | Guyana, Voice of                  | 3291do   | 5950do   |
| 0900 | 1000 | Sat/Sun   | Italy, IRRS                       | 9310eu   | 13840eu  |
| 0900 | 1000 |           | Malaysia, RTM/Trax FM             | 7295as   |          |
| 0900 | 1000 | vi        | Namibia, Namibian BC Corp         | 3270do   | 3290do   |
|      |      |           | 6060do                            | 6175do   |          |
| 0900 | 1000 |           | New Zealand, Radio NZ Intl        | 9765pa   |          |
| 0900 | 1000 | DRM       | New Zealand, Radio NZ Intl        | 9890pa   |          |
| 0900 | 1000 |           | Nigeria, Radio/Ibadan             | 6050do   |          |
| 0900 | 1000 |           | Nigeria, Radio/Kaduna             | 4770do   | 6090do   |
| 0900 | 1000 |           | Nigeria, Radio/Lagos              | 3326do   | 4990do   |
| 0900 | 1000 |           | Papua New Guinea, Catholic Radio  |          | 4960do   |
| 0900 | 1000 |           | Papua New Guinea, NBC             | 4890do   |          |
| 0900 | 1000 | vi        | Papua New Guinea, Wantok R. Light | 7120va   |          |
| 0900 | 1000 |           | Russia, Voice of                  | 17495oc  | 17665oc  |
| 0900 | 1000 | DRM       | Russia, Voice of                  | 12060eu  |          |
| 0900 | 1000 | vi        | Rwanda, Radio                     | 6055do   |          |
| 0900 | 1000 | irreg/ vi | Sierra Leone, SLBS 3316do         |          |          |
| 0900 | 1000 |           | Singapore, MediaCorp Radio        | 6150do   |          |
| 0900 | 1000 | vi        | Solomon Islands, SIBC             | 5020do   | 9545do   |
| 0900 | 1000 | vi        | South Africa, Channel Africa      | 9620af   |          |
| 0900 | 1000 | DRM       | UK, BBC World Service             | 1296eu   |          |
| 0900 | 1000 | mtwhf     | UK, BBC World Service             | 15400af  | 15575as  |
|      |      |           | 17830af                           |          |          |
| 0900 | 1000 |           | UK, BBC World Service             | 5975as   | 6190af   |
|      |      |           | 6195as                            | 7320eu   | 9470eu   |
|      |      |           | 11760me                           | 11940af  | 12095eu  |
|      |      |           | 15485eu                           | 17760as  | 17790as  |
|      |      |           | 21470af                           | 21660as  | 17885af  |
| 0900 | 1000 | Sat/Sun   | UK, BBC World Service             | 15575as  | 17830af  |
| 0900 | 1000 |           | USA, American Forces Radio        | 4319usb  | 5446usb  |
|      |      |           | 5765usb                           | 6350usb  | 7811usb  |
|      |      |           | 12133usb                          | 13362usb | 10320usb |
| 0900 | 1000 |           | USA, KAIJ Dallas TX               | 5755na   |          |
| 0900 | 1000 |           | USA, KTNB Salt Lake City UT       | 7505na   |          |
| 0900 | 1000 |           | USA, KWHR Naalehu HI              | 9930as   | 11565as  |
| 0900 | 1000 |           | USA, WBCQ Kennebunk ME            | 5110na   | 7415na   |
| 0900 | 1000 |           | USA, WBOH Newport NC              | 5920am   |          |
| 0900 | 1000 |           | USA, WEWN Birmingham AL           | 5850na   |          |
| 0900 | 1000 |           | USA, WHRI Cypress Creek SC        | 7315am   | 7520am   |
| 0900 | 1000 |           | USA, WRMI Miami FL                | 9955am   |          |
| 0900 | 1000 |           | USA, WTJC Newport NC              | 9370na   |          |
| 0900 | 1000 |           | USA, WWCR Nashville TN            | 3215na   | 5070na   |
|      |      |           | 5765na                            | 5935na   |          |
| 0900 | 1000 |           | USA, WWRB Manchester TN           | 3185na   | 5085na   |
| 0900 | 1000 |           | USA, WYFR/Family R Okeechobee FL  | 5950na   |          |
|      |      |           | 6885na                            | 7455na   | 9450va   |
| 0900 | 1000 | vi        | Vanuatu, Radio                    | 4960do   |          |
| 0900 | 1000 |           | Zambia, Christian Voice           | 6065af   |          |
| 0930 | 1000 |           | Australia, HCJB                   | 15360as  |          |
| 0930 | 1000 |           | Lithuania, Radio Vilnius          | 9710eu   |          |

#### 1000 UTC - 5AM EST / 4AM CST / 2AM PST

|      |      |  |                                 |         |         |
|------|------|--|---------------------------------|---------|---------|
| 1000 | 1027 |  | Czech Rep, Radio Prague         | 9955am  | 15710as |
|      |      |  | 21745af                         |         |         |
| 1000 | 1030 |  | Mongolia, Voice of              | 12085as |         |
| 1000 | 1030 |  | UK, BBC World Service           | 5975as  | 15285as |
|      |      |  | 21660as                         |         |         |
| 1000 | 1057 |  | Netherlands, Radio              | 6040as  | 9795as  |
|      |      |  | 12065as                         |         |         |
| 1000 | 1059 |  | New Zealand, Radio NZ Intl      | 9765pa  |         |
| 1000 | 1100 |  | Anguilla, University Network    | 11775am |         |
| 1000 | 1100 |  | Australia, ABC NT Alice Springs | 2310do  |         |
|      |      |  | 4835do                          |         |         |
| 1000 | 1100 |  | Australia, ABC NT Katherine     | 2485do  |         |
| 1000 | 1100 |  | Australia, ABC NT Tennant Creek |         | 2325do  |
| 1000 | 1100 |  | Australia, CVC International    | 11955as |         |
| 1000 | 1100 |  | Australia, HCJB                 | 15430as |         |

|      |      |         |                                   |          |         |          |  |
|------|------|---------|-----------------------------------|----------|---------|----------|--|
| 1000 | 1100 |         | Australia, Radio                  | 9580va   | 9590va  | 15415as  |  |
| 1000 | 1100 |         | Canada, CFRX Toronto ON           | 6070na   |         |          |  |
| 1000 | 1100 |         | Canada, CFVP Calgary AB           | 6030na   |         |          |  |
| 1000 | 1100 |         | Canada, CKZN St John's NF         | 6160na   |         |          |  |
| 1000 | 1100 |         | Canada, CKZU Vancouver BC         | 6160na   |         |          |  |
| 1000 | 1100 |         | China, China Radio Intl           | 5955as   | 7135as  |          |  |
|      |      |         | 7215as                            | 13590as  | 13720as | 15190as  |  |
|      |      |         | 15210as                           | 15350as  | 17490eu | 17690as  |  |
|      |      |         | 17750as                           |          |         |          |  |
| 1000 | 1100 |         | Costa Rica, University Network    | 5030va   | 6150va  |          |  |
|      |      |         | 7375va                            | 9725va   | 11870va | 13750va  |  |
| 1000 | 1100 |         | Germany, CVC The Voice Africa     |          | 9555af  |          |  |
| 1000 | 1100 |         | Guyana, Voice of                  | 3291do   | 5950do  |          |  |
| 1000 | 1100 |         | India, All India Radio            | 13710oc  | 15020as |          |  |
|      |      |         | 15235as                           | 17510pa  | 17800as | 17895pa  |  |
| 1000 | 1100 | Sat/Sun | Italy, IRRS                       | 9310eu   | 13840eu |          |  |
| 1000 | 1100 |         | Japan, Radio Japan/NHK World      |          | 6120na  |          |  |
|      |      |         | 9695as                            | 11730as  | 17585va | 17720me  |  |
|      |      |         | 21755oc                           |          |         |          |  |
| 1000 | 1100 |         | Malaysia, RTM/Trax FM             | 7295as   |         |          |  |
| 1000 | 1100 | DRM     | New Zealand, Radio NZ Intl        | 9890pa   |         |          |  |
| 1000 | 1100 |         | Nigeria, Voice of                 | 15120af  |         |          |  |
| 1000 | 1100 |         | North Korea, Voice of Korea       | 6185as   | 6285am  |          |  |
|      |      |         | 9850as                            |          |         |          |  |
| 1000 | 1100 |         | Papua New Guinea, Catholic Radio  |          | 4960do  |          |  |
| 1000 | 1100 |         | Papua New Guinea, NBC             | 4890do   |         |          |  |
| 1000 | 1100 | vl      | Papua New Guinea, Wantok R. Light |          | 7120va  |          |  |
| 1000 | 1100 |         | Singapore, MediaCorp Radio        | 6150do   |         |          |  |
| 1000 | 1100 | vl      | Solomon Islands, SIBC             | 5020do   | 9545do  |          |  |
| 1000 | 1100 | vl      | South Africa, Channel Africa      | 9620af   |         |          |  |
| 1000 | 1100 | DRM     | UK, BBC World Service             | 1296eu   |         |          |  |
| 1000 | 1100 |         | UK, BBC World Service             | 6190af   | 6195as  |          |  |
|      |      |         | 7320eu                            | 9470eu   | 9740as  | 11760me  |  |
|      |      |         | 11940af                           | 11945as  | 15485eu | 15575as  |  |
|      |      |         | 17640eu                           | 17790as  | 17885af | 21470af  |  |
| 1000 | 1100 | Sat/Sun | UK, BBC World Service             |          | 17830af |          |  |
| 1000 | 1100 |         | USA, American Forces Radio        | 4319usb  | 5446usb |          |  |
|      |      |         | 5765usb                           | 6350usb  | 7811usb | 10320usb |  |
|      |      |         | 12133usb                          | 13362usb |         |          |  |
| 1000 | 1100 |         | USA, KAIJ Dallas TX               | 5755na   |         |          |  |
| 1000 | 1100 |         | USA, KNLS Anchor Point AK         | 6150as   |         |          |  |
| 1000 | 1100 |         | USA, KTNB Salt Lake City UT       | 7505na   |         |          |  |
| 1000 | 1100 |         | USA, KWHR Naalehu HI              | 9930as   | 11565as |          |  |
| 1000 | 1100 |         | USA, WBQC Kennebunk ME            | 5110na   | 7415na  |          |  |
| 1000 | 1100 |         | USA, WBOH Newport NC              | 5920am   |         |          |  |
| 1000 | 1100 |         | USA, WEWN Birmingham AL           | 5850na   |         |          |  |
| 1000 | 1100 |         | USA, WHRI Cypress Creek SC        | 7315am   | 7520am  |          |  |
| 1000 | 1100 |         | USA, WRMI Miami FL                | 9955am   |         |          |  |
| 1000 | 1100 |         | USA, WTJC Newport NC              | 9370na   |         |          |  |
| 1000 | 1100 |         | USA, WWCR Nashville TN            | 5070na   | 5765na  |          |  |
|      |      |         | 5935na                            | 9985na   |         |          |  |
| 1000 | 1100 |         | USA, WWRB Manchester TN           | 3185na   | 5085na  |          |  |
| 1000 | 1100 |         | USA, WYFR/Family R Okeechobee FL  | 5950na   |         |          |  |
|      |      |         | 6855na                            | 6890na   | 7455na  | 9450va   |  |
| 1000 | 1100 |         | Zambia, Christian Voice           | 6065af   |         |          |  |
| 1030 | 1045 | mtwhf   | Ethiopia, Radio                   | 5990af   | 7110af  | 9704af   |  |
| 1030 | 1045 |         | Israel, Kol Israel                | 15760eu  | 17535eu |          |  |
| 1030 | 1058 |         | Vietnam, Voice of                 | 7285as   |         |          |  |
| 1030 | 1100 |         | Australia, HCJB                   | 15400as  |         |          |  |
| 1030 | 1100 |         | Iran, Voice of the Islamic Rep    |          | 15460as | 17660as  |  |
| 1030 | 1100 | Sat/Sun | Italy, IRRS                       | 9310va   |         |          |  |
| 1030 | 1100 |         | UK, BBC World Service             |          | 9605as  | 11750as  |  |
|      |      |         | 15285as                           | 15545as  |         |          |  |
| 1030 | 1100 | s       | UK, Bible Voice                   | 5950as   |         |          |  |

### 1100 UTC - 6AM EST / 5AM CST / 3AM PST

|      |      |         |                                 |         |         |         |  |
|------|------|---------|---------------------------------|---------|---------|---------|--|
| 1100 | 1104 |         | Pakistan, Radio                 | 15100as | 17835as |         |  |
| 1100 | 1127 |         | Iran, Voice of the Islamic Rep  | 15460as | 17600as |         |  |
| 1100 | 1128 |         | Vietnam, Voice of               | 9840as  | 7220as  | 7285as  |  |
| 1100 | 1130 |         | Australia, HCJB                 | 15400as |         |         |  |
| 1100 | 1130 | mtwhf   | UK, BBC World Service           |         | 6130am  |         |  |
| 1100 | 1200 |         | Anguilla, University Network    |         | 11775am |         |  |
| 1100 | 1200 |         | Australia, ABC NT Alice Springs |         | 2310do  |         |  |
|      |      |         | 4835do                          |         |         |         |  |
| 1100 | 1200 |         | Australia, ABC NT Katherine     |         | 2485do  |         |  |
| 1100 | 1200 |         | Australia, ABC NT Tennant Creek |         | 2325do  |         |  |
| 1100 | 1200 |         | Australia, CVC International    |         | 13635as |         |  |
| 1100 | 1200 |         | Australia, Radio                | 5995va  | 6020va  | 9475as  |  |
|      |      |         | 9560pa                          | 9580va  | 9590va  | 12080as |  |
| 1100 | 1200 | Sat/Sun | Canada, CBC NQ SW Service       |         | 9625na  |         |  |
| 1100 | 1200 |         | Canada, CFRX Toronto ON         |         | 6070na  |         |  |
| 1100 | 1200 |         | Canada, CFVP Calgary AB         |         | 6030na  |         |  |
| 1100 | 1200 |         | Canada, CKZN St John's NF       |         | 6160na  |         |  |
| 1100 | 1200 |         | Canada, CKZU Vancouver BC       |         | 6160na  |         |  |
| 1100 | 1200 |         | China, China Radio Intl         | 5955as  | 5960na  |         |  |
|      |      |         | 9570as                          | 11650as | 11795as | 13590as |  |
|      |      |         | 13645as                         | 13665eu | 13720as | 17490eu |  |
| 1100 | 1200 |         | Costa Rica, University Network  | 5030va  | 6150va  |         |  |
|      |      |         | 7375va                          | 9725va  | 11870va | 13750va |  |
| 1100 | 1200 |         | Germany, CVC The Voice Africa   |         | 9555af  |         |  |
| 1100 | 1200 | s       | Germany, Universal Life         |         | 6055me  |         |  |

|      |      |         |                                   |          |         |          |  |
|------|------|---------|-----------------------------------|----------|---------|----------|--|
| 1100 | 1200 | Sat/Sun | Italy, IRRS                       | 9310eu   | 15735eu |          |  |
| 1100 | 1200 |         | Japan, Radio Japan/NHK World      |          | 6120na  |          |  |
|      |      |         | 9695as                            | 11730as  |         |          |  |
| 1100 | 1200 | vl      | Libya, Voice of Africa            |          | 17725af | 21695af  |  |
| 1100 | 1200 |         | Malaysia, RTM/Trax FM             |          | 7295as  |          |  |
| 1100 | 1200 |         | New Zealand, Radio NZ Intl        |          | 13840pa |          |  |
| 1100 | 1200 | DRM     | New Zealand, Radio NZ Intl        |          | 9890pa  |          |  |
| 1100 | 1200 |         | Nigeria, Voice of                 | 15120af  |         |          |  |
| 1100 | 1200 |         | Papua New Guinea, Catholic Radio  |          | 4960do  |          |  |
| 1100 | 1200 |         | Papua New Guinea, NBC             |          | 4890do  |          |  |
| 1100 | 1200 | vl      | Papua New Guinea, Wantok R. Light |          | 7120va  |          |  |
| 1100 | 1200 |         | Singapore, Radio Singapore Intl   |          | 6080as  |          |  |
|      |      |         | 6150as                            |          |         |          |  |
| 1100 | 1200 | vl      | South Africa, Channel Africa      |          | 9620af  |          |  |
| 1100 | 1200 |         | Taiwan, Radio Taiwan Intl         |          | 7445as  |          |  |
| 1100 | 1200 | DRM     | UK, BBC World Service             |          | 1296eu  |          |  |
| 1100 | 1200 | Sat/Sun | UK, BBC World Service             |          | 5875am  | 6130am   |  |
| 1100 | 1200 |         | UK, BBC World Service             |          | 6190af  | 6195as   |  |
|      |      |         | 7320eu                            | 9470eu   | 9740as  | 11760me  |  |
|      |      |         | 11940af                           | 11945as  | 15485eu | 15575as  |  |
|      |      |         | 17640eu                           | 17790as  | 17830af | 17885af  |  |
|      |      |         | 21470af                           |          |         |          |  |
| 1100 | 1200 | Sat/Sun | UK, Bible Voice                   | 5950as   |         |          |  |
| 1100 | 1200 |         | USA, American Forces Radio        | 4319usb  | 5446usb |          |  |
|      |      |         | 5765usb                           | 6350usb  | 7811usb | 10320usb |  |
|      |      |         | 12133usb                          | 13362usb |         |          |  |
| 1100 | 1200 |         | USA, KAIJ Dallas TX               |          | 5755na  |          |  |
| 1100 | 1200 |         | USA, KTNB Salt Lake City UT       |          | 7505na  |          |  |
| 1100 | 1200 |         | USA, KWHR Naalehu HI              |          | 9930as  | 11565as  |  |
| 1100 | 1200 |         | USA, WBOH Newport NC              |          | 5920am  |          |  |
| 1100 | 1200 |         | USA, WEWN Birmingham AL           |          | 5850na  |          |  |
| 1100 | 1200 |         | USA, WHRI Cypress Creek SC        |          | 5875am  | 7315am   |  |
| 1100 | 1200 |         | USA, WINB Red Lion PA             |          | 9265am  |          |  |
| 1100 | 1200 |         | USA, WRMI Miami FL                |          | 9955am  |          |  |
| 1100 | 1200 |         | USA, WTJC Newport NC              |          | 9370na  |          |  |
| 1100 | 1200 |         | USA, WWCR Nashville TN            |          | 5070na  | 5765na   |  |
|      |      |         | 5935na                            | 15825na  |         |          |  |
| 1100 | 1200 |         | USA, WWRB Manchester TN           |          | 3185na  | 5085na   |  |
| 1100 | 1200 |         | USA, WYFR/Family R Okeechobee FL  |          | 5950na  |          |  |
|      |      |         | 6890na                            | 7780na   | 11725am | 11725na  |  |
|      |      |         | 11830na                           |          |         |          |  |
| 1100 | 1200 |         | Zambia, Christian Voice           |          | 6065af  |          |  |
| 1105 | 1200 | s       | Greece, Voice of                  | 9420eu   | 17525va |          |  |
| 1115 | 1130 | mtwhf   | UK, Bible Voice                   | 5950as   |         |          |  |
| 1130 | 1145 |         | UK, BBC World Service             |          | 7135as  | 11920as  |  |
| 1130 | 1157 |         | Czech Rep, Radio Prague           |          | 11640eu | 17545va  |  |
| 1130 | 1200 | mtwhf   | Australia, HCJB                   | 15430as  |         |          |  |
| 1130 | 1200 | a       | Germany, Universal Life           |          | 6055me  |          |  |
| 1130 | 1200 |         | Guam, AWR/KSDA 15260as            |          |         |          |  |
| 1130 | 1200 | mtwhf   | UK, BBC World Service             |          | 5875am  | 6130am   |  |
| 1130 | 1200 |         | Vatican City, Vatican Radio       |          | 15595va | 17765va  |  |
| 1157 | 1200 |         | Greece, Macedonias Radio          |          | 9935eu  |          |  |

### 1200 UTC - 7AM EST / 6AM CST / 4AM PST

|      |      |         |                                 |         |         |         |  |
|------|------|---------|---------------------------------|---------|---------|---------|--|
| 1200 | 1215 | f       | UK, Bible Voice                 | 5950as  |         |         |  |
| 1200 | 1230 |         | France, Radio France Intl       |         | 15275af | 17815af |  |
|      |      |         | 21620af                         |         |         |         |  |
| 1200 | 1230 |         | UAE, AWR Africa                 | 15110as |         |         |  |
| 1200 | 1257 |         | Netherlands, Radio              |         | 11675na |         |  |
| 1200 | 1259 |         | Canada, Radio Canada Intl       |         | 7105as  | 9665as  |  |
| 1200 | 1259 | DRM     | New Zealand, Radio NZ Intl      |         | 9890pa  |         |  |
| 1200 | 1300 |         | Anguilla, University Network    |         | 11775am |         |  |
| 1200 | 1300 |         | Australia, ABC NT Alice Springs |         | 2310do  |         |  |
|      |      |         | 4835do                          |         |         |         |  |
| 1200 | 1300 |         | Australia, ABC NT Katherine     |         | 2485do  |         |  |
| 1200 | 1300 |         | Australia, ABC NT Tennant Creek |         | 2325do  |         |  |
| 1200 | 1300 |         | Australia, CVC International    |         | 13635as |         |  |
| 1200 | 1300 |         | Australia, Radio                | 5995va  | 6020va  | 9475as  |  |
|      |      |         | 9560pa                          | 9580va  | 9590va  |         |  |
| 1200 | 1300 | Sat/Sun | Canada, CBC NQ SW Service       |         | 9625na  |         |  |
| 1200 | 1300 |         | Canada, CFRX Toronto ON         |         | 6070na  |         |  |
| 1200 | 1300 |         | Canada, CFVP Calgary AB         |         | 6030na  |         |  |
| 1200 | 1300 |         | Canada, CKZN St John's NF       |         | 6160na  |         |  |
| 1200 | 1300 |         | Canada, CKZU Vancouver BC       |         | 6160na  |         |  |
| 1200 | 1300 |         | China, China Radio Intl         |         | 5955as  | 7250as  |  |
|      |      |         | 9460as                          | 9730as  | 9760as  | 11650as |  |
|      |      |         | 11690as                         | 11980as | 12080as | 13655eu |  |
|      |      |         | 13790eu                         | 17490eu |         |         |  |
| 1200 | 1300 |         | Costa Rica, University Network  | 9725va  | 11870va |         |  |
|      |      |         | 13750va                         |         |         |         |  |
| 1200 | 1300 |         | Germany, CVC International      |         | 11830me |         |  |
| 1200 | 1300 |         | Germany, CVC The Voice Africa   |         | 9555af  |         |  |
| 1200 | 1300 | s       | Germany, Overcomer Ministries   |         | 6110eu  |         |  |
| 1200 | 1300 | Sat/Sun | Germany, Universal Life         |         | 6045me  |         |  |
| 1200 | 1300 | Sat/Sun | Italy, IRRS                     | 9310af  | 15735eu |         |  |
| 1200 | 1300 | f       | Italy, IRRS                     | 15750va |         |         |  |
| 1200 | 1300 | vl      | Libya, Voice of Africa          |         | 17625af | 17660af |  |
|      |      |         | 17670af                         | 17675af | 17680af |         |  |
| 1200 | 1300 |         | Malaysia, RTM/Trax FM           |         | 7295as  |         |  |
| 1200 | 1300 |         | New Zealand, Radio NZ Intl      |         | 13840pa |         |  |
| 1200 | 1300 |         | Nigeria, Voice of               | 15120af |         |         |  |



|      |      |     |                                   |          |          |
|------|------|-----|-----------------------------------|----------|----------|
| 1200 | 1300 |     | Papua New Guinea, Catholic Radio  | 4960do   |          |
| 1200 | 1300 |     | Papua New Guinea, NBC             | 4890do   |          |
| 1200 | 1300 | vl  | Papua New Guinea, Wantok R. Light | 7120va   |          |
| 1200 | 1300 |     | Singapore, Radio Singapore Intl   | 6080as   |          |
|      |      |     | 6150as                            |          |          |
| 1200 | 1300 | vl  | South Africa, Channel Africa      | 9620af   |          |
| 1200 | 1300 |     | South Korea, KBS World Radio      | 9650na   |          |
| 1200 | 1300 |     | Taiwan, Radio Taiwan Intl         | 7130am   |          |
| 1200 | 1300 | DRM | UK, BBC World Service             | 1296eu   |          |
| 1200 | 1300 |     | UK, BBC World Service             | 5975as   | 6190af   |
|      |      |     | 6195as                            | 7320eu   | 9660am   |
|      |      |     | 9740as                            | 9750am   | 11760me  |
|      |      |     | 11940as                           | 15310as  | 15485eu  |
|      |      |     | 17640eu                           | 17790as  | 17830af  |
|      |      |     |                                   |          | 17885af  |
| 1200 | 1300 |     | Ukraine, Radio Ukraine Intl       | 9925eu   |          |
| 1200 | 1300 |     | USA, American Forces Radio        | 4319usb  | 5446usb  |
|      |      |     | 5765usb                           | 6350usb  | 7811usb  |
|      |      |     | 12133usb                          | 13362usb | 10320usb |
| 1200 | 1300 |     | USA, KAJI Dallas TX               | 5755na   |          |
| 1200 | 1300 |     | USA, KNLS Anchor Point AK         | 6150as   | 6915as   |
| 1200 | 1300 |     | USA, KTVN Salt Lake City UT       | 7505na   |          |
| 1200 | 1300 |     | USA, KWHR Naalehu HI              | 11565as  | 12130as  |
| 1200 | 1300 |     | USA, Voice of America             | 9645va   | 9760va   |
|      |      |     | 11705va                           | 11730va  | 15190va  |
| 1200 | 1300 |     | USA, WBOH Newport NC              | 5920am   |          |
| 1200 | 1300 |     | USA, WEWN Birmingham AL           | 9955na   |          |
| 1200 | 1300 |     | USA, WHRA Greenbush ME            | 15665na  |          |
| 1200 | 1300 |     | USA, WHRI Cypress Creek SC        | 7520am   | 9660am   |
| 1200 | 1300 |     | USA, WINB Red Lion PA             | 9265am   |          |
| 1200 | 1300 |     | USA, WRMI Miami FL                | 9955am   |          |
| 1200 | 1300 |     | USA, WTJC Newport NC              | 9370na   |          |
| 1200 | 1300 |     | USA, WWCR Nashville TN            | 5070na   | 5765na   |
|      |      |     | 5935na                            | 15825na  |          |
| 1200 | 1300 |     | USA, WWRB Manchester TN           | 9385na   |          |
| 1200 | 1300 |     | USA, WYFR/Family R Okeechobee FL  | 6890na   |          |
|      |      |     | 7780na                            | 11530am  | 11970na  |
| 1200 | 1300 | DRM | Vatican City, Vatican Radio       | 13770am  |          |
| 1200 | 1300 |     | Zambia, Christian Voice           | 6065af   |          |
| 1215 | 1300 |     | Egypt, Radio Cairo                | 17835as  |          |
| 1230 | 1258 |     | Vietnam, Voice of                 | 9840as   | 12020as  |
| 1230 | 1300 |     | Bangladesh, Bangla Betar          | 7185as   |          |
| 1230 | 1300 |     | Bulgaria, Radio                   | 11700eu  | 15700eu  |
| 1230 | 1300 |     | Thailand, Radio                   | 9835oc   |          |
| 1245 | 1300 | s   | Australia, HCJB                   | 15430as  |          |
| 1255 | 1258 |     | Finland, YLE/Radio Finland        | 13715do  | 15400do  |

### 1300 UTC - 8AM EST / 7AM CST / 5AM PST

|      |      |         |                                   |         |         |
|------|------|---------|-----------------------------------|---------|---------|
| 1300 | 1330 |         | Egypt, Radio Cairo                | 17835as |         |
| 1300 | 1350 | s       | Italy, IRRS                       | 15735as |         |
| 1300 | 1356 |         | Romania, Radio Romania Intl       | 15105eu | 17745eu |
| 1300 | 1359 |         | Poland, Radio Polonia             | 5975eu  | 9525eu  |
| 1300 | 1400 |         | Anguilla, University Network      | 11775am |         |
| 1300 | 1400 |         | Australia, CVC International      | 13635as |         |
| 1300 | 1400 |         | Australia, Radio                  | 5995va  | 6020va  |
|      |      |         | 9580va                            | 9590va  | 9560as  |
| 1300 | 1400 | Sat/Sun | Canada, CBC NQ SW Service         | 9625na  |         |
| 1300 | 1400 |         | Canada, CFRX Toronto ON           | 6070na  |         |
| 1300 | 1400 |         | Canada, CFVP Calgary AB           | 6030na  |         |
| 1300 | 1400 |         | Canada, CKZN St John's NF         | 6160na  |         |
| 1300 | 1400 |         | Canada, CKZU Vancouver BC         | 6160na  |         |
| 1300 | 1400 |         | China, China Radio Intl           | 5955as  | 7300as  |
|      |      |         | 9570na                            | 9655as  | 9730as  |
|      |      |         | 9870as                            | 11760as | 11885na |
|      |      |         | 11980as                           | 13610eu | 13790eu |
| 1300 | 1400 |         | Costa Rica, University Network    | 9725va  | 11870va |
|      |      |         | 13750va                           |         |         |
| 1300 | 1400 |         | Germany, CVC International        | 11830me |         |
| 1300 | 1400 |         | Germany, CVC The Voice Africa     | 9555af  |         |
| 1300 | 1400 |         | Germany, Deutsche Welle           | 6140eu  |         |
| 1300 | 1400 |         | Germany, Overcomer Ministries     | 6110na  |         |
| 1300 | 1400 | vl      | Libya, Voice of Africa            | 17625af | 17660af |
|      |      |         | 17670af                           | 17675af | 17680af |
| 1300 | 1400 |         | Malaysia, RTM/Trax FM             | 7295as  |         |
| 1300 | 1400 | DRM     | New Zealand, Radio NZ Intl        | 7145pa  |         |
| 1300 | 1400 |         | New Zealand, Radio NZ Intl        | 5950pa  |         |
| 1300 | 1400 |         | Nigeria, Voice of                 | 15120af |         |
| 1300 | 1400 |         | North Korea, Voice of Korea       | 7570eu  | 9335na  |
|      |      |         | 11710na                           | 12015eu |         |
| 1300 | 1400 |         | Papua New Guinea, Catholic Radio  | 4960do  |         |
| 1300 | 1400 |         | Papua New Guinea, NBC             | 4890do  |         |
| 1300 | 1400 | vl      | Papua New Guinea, Wantok R. Light | 7120va  |         |
| 1300 | 1400 |         | Singapore, Radio Singapore Intl   | 6080as  |         |
|      |      |         | 6150as                            |         |         |
| 1300 | 1400 | vl      | South Africa, Channel Africa      | 9620af  |         |
| 1300 | 1400 |         | South Korea, KBS World Radio      | 9570na  |         |
|      |      |         | 9770as                            |         |         |
| 1300 | 1400 | DRM     | UK, BBC World Service             | 1296eu  |         |
| 1300 | 1400 |         | UK, BBC World Service             | 5975as  | 6190af  |
|      |      |         | 6195as                            | 7320eu  | 9470eu  |
|      |      |         | 11760me                           | 11895as | 11940af |
|      |      |         | 15420af                           | 15485as | 15575as |
|      |      |         |                                   |         | 17640eu |

|      |      |         |                                  |          |         |          |
|------|------|---------|----------------------------------|----------|---------|----------|
| 1300 | 1400 |         | 17790af                          | 17830af  | 17885af | 21470af  |
|      |      |         | USA, American Forces Radio       | 4319usb  | 5446usb |          |
|      |      |         | 5765usb                          | 6350usb  | 7811usb | 10320usb |
|      |      |         | 12133usb                         | 13362usb |         |          |
| 1300 | 1400 |         | USA, KAJI Dallas TX              | 5755na   |         |          |
| 1300 | 1400 |         | USA, KTVN Salt Lake City UT      | 7505na   |         |          |
| 1300 | 1400 |         | USA, KWHR Naalehu HI             | 12130as  |         |          |
| 1300 | 1400 |         | USA, Voice of America            | 9645va   | 9760va  |          |
|      |      |         | 11705va                          |          |         |          |
| 1300 | 1400 | w f     | USA, WBCQ Kennebunk ME           | 9330na   |         |          |
| 1300 | 1400 |         | USA, WBOH Newport NC             | 5920am   |         |          |
| 1300 | 1400 |         | USA, WEWN Birmingham AL          | 9955na   |         |          |
| 1300 | 1400 |         | USA, WHRA Greenbush ME           | 15665na  |         |          |
| 1300 | 1400 |         | USA, WHRI Cypress Creek SC       | 6095am   |         |          |
| 1300 | 1400 | Sat/Sun | USA, WHRI Cypress Creek SC       | 11785am  |         |          |
| 1300 | 1400 |         | USA, WINB Red Lion PA            | 13570am  |         |          |
| 1300 | 1400 |         | USA, WRMI Miami FL               | 7385na   |         |          |
| 1300 | 1400 |         | USA, WTJC Newport NC             | 9370na   |         |          |
| 1300 | 1400 |         | USA, WWCR Nashville TN           | 7465na   | 9985na  |          |
|      |      |         | 13845na                          | 15825na  |         |          |
| 1300 | 1400 |         | USA, WWRB Manchester TN          | 9385na   |         |          |
| 1300 | 1400 |         | USA, WYFR/Family R Okeechobee FL | 5865as   |         |          |
|      |      |         | 7495as                           | 7780as   | 11560na | 11855na  |
|      |      |         | 11970na                          |          |         |          |
| 1300 | 1400 |         | Zambia, Christian Voice          | 6065af   |         |          |
| 1305 | 1320 | m       | Austria, Radio Austria Intl      | 6155va   | 13730va |          |
|      |      |         | 17855va                          |          |         |          |
| 1305 | 1330 | Sat/Sun | Austria, Radio Austria Intl      | 6155me   | 13730va |          |
|      |      |         | 17855va                          |          |         |          |
| 1315 | 1330 | tw hf   | Austria, Radio Austria Intl      | 17855va  |         |          |
| 1330 | 1357 | a DRM   | Czech Rep, Radio Prague          | 6065na   |         |          |
| 1330 | 1400 |         | Guam, AWR/KSDA 15260as           |          |         |          |
| 1330 | 1400 |         | India, All India Radio           | 9690as   | 11620as |          |
|      |      |         | 13710as                          |          |         |          |
| 1330 | 1400 |         | Laos, National Radio             | 7145as   |         |          |
| 1330 | 1400 |         | Sweden, Radio                    | 7420va   | 11550va | 15240va  |
| 1330 | 1400 | DRM     | Sweden, Radio                    | 7275eu   |         |          |
| 1330 | 1400 |         | Turkey, Voice of                 | 11735as  | 12035eu |          |
| 1335 | 1400 | Sat/Sun | Austria, Radio Austria Intl      | 6155va   | 13730va |          |
|      |      |         | 17855va                          |          |         |          |
| 1345 | 1400 | mtwhf   | Austria, Radio Austria Intl      | 6155va   | 13730va |          |
|      |      |         | 17855va                          |          |         |          |

### 1400 UTC - 9AM EST / 8AM CST / 6AM PST

|      |      |         |                                |         |         |
|------|------|---------|--------------------------------|---------|---------|
| 1400 | 1415 | t h     | Germany, Pan American BC       | 13645me |         |
| 1400 | 1415 |         | Seychelles, FEBA               | 7190as  |         |
| 1400 | 1427 |         | Czech Rep, Radio Prague        | 11600as | 13580na |
| 1400 | 1427 | f DRM   | Czech Rep, Radio Prague        | 9750na  |         |
| 1400 | 1430 |         | Australia, Radio               | 5995va  | 6080va  |
|      |      |         | 9590va                         |         | 7240as  |
| 1400 | 1430 | f       | Guam, TWR/KTWR 9975as          |         |         |
| 1400 | 1430 |         | Thailand, Radio                | 9830oc  |         |
| 1400 | 1430 |         | Turkey, Voice of               | 11735as | 12035eu |
| 1400 | 1430 |         | UK, BBC World Service          | 9470eu  |         |
| 1400 | 1500 |         | Anguilla, University Network   | 11775am |         |
| 1400 | 1500 |         | Australia, CVC International   | 13635as |         |
| 1400 | 1500 | Sat/Sun | Bhutan, BBS                    | 6035as  |         |
| 1400 | 1500 |         | Canada, CBC NQ SW Service      | 9625na  |         |
| 1400 | 1500 |         | Canada, CFRX Toronto ON        | 6070na  |         |
| 1400 | 1500 |         | Canada, CFVP Calgary AB        | 6030na  |         |
| 1400 | 1500 |         | Canada, CKZN St John's NF      | 6160na  |         |
| 1400 | 1500 |         | Canada, CKZU Vancouver BC      | 6160na  |         |
| 1400 | 1500 |         | China, China Radio Intl        | 5955as  | 7300as  |
|      |      |         | 9460as                         | 9700eu  | 9795eu  |
|      |      |         | 9870as                         | 13675na | 13685af |
|      |      |         | 15230na                        | 17630af | 13740na |
| 1400 | 1500 |         | Costa Rica, University Network | 9725va  | 11870va |
|      |      |         | 13750va                        |         |         |
| 1400 | 1500 |         | France, Radio France Intl      | 5920as  | 7180as  |
|      |      |         | 9580af                         | 15615af |         |
| 1400 | 1500 |         | Germany, CVC International     | 13830as | 15715me |
| 1400 | 1500 |         | Germany, CVC The Voice Africa  | 9555af  |         |
| 1400 | 1500 |         | Germany, Deutsche Welle        | 6140eu  |         |
| 1400 | 1500 | a       | Germany, Overcomer Ministries  | 17810eu |         |
| 1400 | 1500 |         | Germany, Overcomer Ministries  | 6110eu  |         |
|      |      |         | 13810va                        |         |         |
| 1400 | 1500 | a       | Greece, Voice of               | 9420eu  | 17525va |
| 1400 | 1500 | mtwh    | Guam, TWR/KTWR 9975as          |         |         |
| 1400 | 1500 |         | India, All India Radio         | 9690as  | 11620as |
|      |      |         | 13710as                        |         |         |
| 1400 | 1500 |         | Japan, Radio Japan/NHK World   | 7200as  |         |
|      |      |         | 9875as                         | 11840oc |         |
| 1400 | 1500 |         | Jordan, Radio                  | 11690na |         |
| 1400 | 1500 |         | Libya, Voice of Africa         | 17660af | 17725af |
|      |      |         | 17850af                        | 21695af |         |
| 1400 | 1500 |         | Malaysia, RTM/Trax FM          | 7295as  |         |
| 1400 | 1500 |         | Netherlands, Radio             | 9345as  | 12080as |
|      |      |         | 15595as                        |         |         |
| 1400 | 1500 | DRM     | New Zealand, Radio NZ Intl     | 7145pa  |         |
| 1400 | 1500 |         | New Zealand, Radio NZ Intl     | 5950pa  |         |
| 1400 | 1500 |         | Nigeria, Voice of              | 15120af |         |

|      |      |         |                                   |          |          |
|------|------|---------|-----------------------------------|----------|----------|
| 1400 | 1500 |         | Oman, Radio Oman                  | 15140as  |          |
| 1400 | 1500 | vl      | Papua New Guinea, Wantok R. Light | 7120va   |          |
| 1400 | 1500 |         | Singapore, MediaCorp Radio        | 6150do   |          |
| 1400 | 1500 | vl      | South Africa, Channel Africa      | 9620af   |          |
| 1400 | 1500 |         | Taiwan, Radio Taiwan Intl         | 15265as  |          |
| 1400 | 1500 | DRM     | UK, BBC World Service             | 7320eu   |          |
| 1400 | 1500 |         | UK, BBC World Service             | 5975as   | 6190af   |
|      |      |         | 6195as                            | 9410eu   | 11760as  |
|      |      |         | 11895as                           | 11920as  | 11940as  |
|      |      |         | 15485eu                           | 17830eu  | 17885af  |
| 1400 | 1500 | DRM     | UK, BBC World Service             | 7320eu   | 21470af  |
| 1400 | 1500 | Sat/Sun | UK, Bible Voice                   | 11695as  |          |
| 1400 | 1500 |         | USA, American Forces Radio        | 4319usb  | 5446usb  |
|      |      |         | 5765usb                           | 6350usb  | 7811usb  |
|      |      |         | 12133usb                          | 13362usb | 10320usb |
| 1400 | 1500 |         | USA, KALJ Dallas TX               | 9480na   |          |
| 1400 | 1500 |         | USA, KJES Vado NM                 | 11715na  |          |
| 1400 | 1500 |         | USA, KNLS Anchor Point AK         | 6150as   |          |
| 1400 | 1500 |         | USA, KTNB Salt Lake City UT       | 7505na   | 15590na  |
| 1400 | 1500 |         | USA, KWHR Naalehu HI              | 9930as   |          |
| 1400 | 1500 |         | USA, Voice of America             | 4930af   | 6080af   |
|      |      |         | 7125va                            | 9695va   | 11655va  |
|      |      |         | 12150va                           | 15205va  | 15580af  |
| 1400 | 1500 |         | USA, WBCQ Kennebunk ME            | 9330na   |          |
| 1400 | 1500 |         | USA, WBOH Newport NC              | 5920am   |          |
| 1400 | 1500 |         | USA, WEWN Birmingham AL           | 9955na   |          |
| 1400 | 1500 |         | USA, WHRA Greenbush ME            | 15665na  |          |
| 1400 | 1500 |         | USA, WHRI Cypress Creek SC        | 6095am   | 9840am   |
| 1400 | 1500 | Sat/Sun | USA, WHRI Cypress Creek SC        | 11795am  |          |
| 1400 | 1500 |         | USA, WINB Red Lion PA             | 13570am  |          |
| 1400 | 1500 |         | USA, WRMI Miami FL                | 7385na   |          |
| 1400 | 1500 |         | USA, WTJC Newport NC              | 9370na   |          |
| 1400 | 1500 |         | USA, WWCN Nashville TN            | 7465na   | 9985na   |
|      |      |         | 13845na                           | 15825na  |          |
| 1400 | 1500 |         | USA, WWRB Manchester TN           | 9385na   |          |
| 1400 | 1500 |         | USA, WYFR/Family R Okeechobee FL  | 7580as   |          |
|      |      |         | 11560as                           | 11565na  | 11855na  |
|      |      |         | 17760na                           |          | 13695na  |
| 1400 | 1500 |         | Zambia, Christian Voice           | 6065af   |          |
| 1415 | 1430 |         | Nepal, Radio                      | 3230as   | 5005as   |
|      |      |         | 7165as                            |          | 6100as   |
| 1430 | 1445 | s       | Germany, Pan American BC          | 13645as  | 13820as  |
| 1430 | 1459 | DRM     | Canada, Radio Canada Intl         | 7240eu   |          |
| 1430 | 1500 |         | Australia, Radio                  | 5995va   | 6080va   |
|      |      |         | 9475as                            | 9590va   | 11660pa  |
| 1430 | 1500 |         | Myanmar, Radio                    | 5986as   |          |
| 1430 | 1500 | DRM     | South Korea, KBS World Radio      |          | 9770eu   |
| 1430 | 1500 |         | Sweden, Radio                     | 11550va  | 15240va  |
| 1430 | 1500 |         | UK, BBC World Service             | 7465eu   |          |

### 1500 UTC - 10AM EST / 9AM CST / 7AM PST

|      |      |         |                                |         |         |
|------|------|---------|--------------------------------|---------|---------|
| 1500 | 1510 | mtwhfa  | Turkmenistan, Turkmen Radio    | 5015eu  |         |
| 1500 | 1527 |         | Czech Rep, Radio Prague        | 7385na  | 15160na |
| 1500 | 1528 |         | Vietnam, Voice of              | 9550va  | 9840va  |
|      |      |         | 13860va                        |         | 12020va |
| 1500 | 1530 |         | Guam, AWR/KSDA                 | 12105as |         |
| 1500 | 1530 |         | Mongolia, Voice of             | 12015eu |         |
| 1500 | 1530 |         | UK, BBC World Service          | 11860af | 15420af |
|      |      |         | 17885af                        |         |         |
| 1500 | 1530 |         | USA, Voice of America          | 7175va  | 9760va  |
|      |      |         | 15460va                        |         |         |
| 1500 | 1545 |         | Germany, CVC The Voice Africa  |         | 9555af  |
| 1500 | 1545 |         | Seychelles, FEBA               | 7340as  |         |
| 1500 | 1545 |         | Sweden, IBRA Radio             | 7340as  |         |
| 1500 | 1550 | DRM     | New Zealand, Radio NZ Intl     | 7145pa  |         |
| 1500 | 1550 |         | New Zealand, Radio NZ Intl     | 5950pa  |         |
| 1500 | 1557 |         | Canada, Radio Canada Intl      | 9635as  | 11870as |
|      |      |         | 11975as                        |         |         |
| 1500 | 1557 |         | Netherlands, Radio             | 9345as  | 12080as |
|      |      |         | 15595as                        |         |         |
| 1500 | 1558 |         | Libya, Voice of Africa         | 17660af | 17725af |
|      |      |         | 17850af                        | 21695af |         |
| 1500 | 1559 |         | Germany, Deutsche Welle        | 6140eu  |         |
| 1500 | 1600 |         | Anguilla, University Network   | 11775am |         |
| 1500 | 1600 |         | Australia, CVC International   | 13635as |         |
| 1500 | 1600 |         | Australia, Radio               | 5995va  | 6080va  |
|      |      |         | 9475as                         | 9590va  | 7240as  |
| 1500 | 1600 | Sat/Sun | Canada, CBC NQ SW Service      | 9625na  |         |
| 1500 | 1600 |         | Canada, CFRX Toronto ON        | 6070na  |         |
| 1500 | 1600 |         | Canada, CFVP Calgary AB        | 6030na  |         |
| 1500 | 1600 |         | Canada, CKZN St John's NF      | 6160na  |         |
| 1500 | 1600 |         | Canada, CKZU Vancouver BC      | 6160na  |         |
| 1500 | 1600 |         | China, China Radio Intl        | 5955as  | 7160as  |
|      |      |         | 7325as                         | 9435eu  | 9525eu  |
|      |      |         | 9870as                         | 13685af | 13740na |
| 1500 | 1600 | DRM     | China, China Radio Intl        | 9750eu  | 13630af |
| 1500 | 1600 |         | Costa Rica, University Network | 9725va  | 11870va |
|      |      |         | 13750va                        |         |         |
| 1500 | 1600 |         | Germany, CVC International     | 11705as | 11830me |
| 1500 | 1600 |         | Germany, Overcomer Ministries  |         | 6110eu  |
|      |      |         | 13810va                        |         |         |

|      |      |           |                                   |          |          |
|------|------|-----------|-----------------------------------|----------|----------|
| 1500 | 1600 | s         | Germany, Overcomer Ministries     |          | 17815na  |
| 1500 | 1600 | s         | Italy, IRRS                       | 9310eu   |          |
| 1500 | 1600 |           | Japan, Radio Japan/NHK World      | 7200as   | 9505va   |
|      |      |           |                                   | 9875as   | 6190as   |
| 1500 | 1600 |           | Jordan, Radio                     | 11690na  |          |
| 1500 | 1600 |           | Malaysia, RTM/Trax FM             | 7295as   |          |
| 1500 | 1600 |           | North Korea, Voice of Korea       | 7570eu   | 9335na   |
|      |      |           | 11710na                           | 12015eu  |          |
| 1500 | 1600 | vl        | Papua New Guinea, Wantok R. Light |          | 7120va   |
| 1500 | 1600 |           | Russia, Voice of                  | 7260as   | 7350as   |
| 1500 | 1600 | DRM       | Russia, Voice of                  | 5905eu   | 5920eu   |
| 1500 | 1600 |           | Singapore, MediaCorp Radio        | 6150do   |          |
| 1500 | 1600 | vl        | South Africa, Channel Africa      | 9620af   |          |
| 1500 | 1600 |           | South Africa, Channel Africa      | 17770af  |          |
| 1500 | 1600 | DRM       | UK, BBC World Service             | 5870eu   |          |
| 1500 | 1600 |           | UK, BBC World Service             | 5875eu   | 5965as   |
|      |      |           | 5975as                            | 6190af   | 6195as   |
|      |      |           | 9410eu                            | 9740as   | 9810as   |
|      |      |           | 11920as                           | 11940af  | 12095eu  |
|      |      |           | 15400af                           | 17830af  | 21470af  |
| 1500 | 1600 | f DRM     | UK, China BS VT Digital           | 9710eu   |          |
| 1500 | 1600 | vl/ mtwhf | UK, Sudan Radio Service           | 15575af  |          |
| 1500 | 1600 |           | USA, American Forces Radio        | 4319usb  | 5446usb  |
|      |      |           | 5765usb                           | 6350usb  | 7811usb  |
|      |      |           | 12133usb                          | 13362usb | 10320usb |
| 1500 | 1600 |           | USA, KALJ Dallas TX               | 9480na   |          |
| 1500 | 1600 |           | USA, KJES Vado NM                 | 11715na  |          |
| 1500 | 1600 |           | USA, KTNB Salt Lake City UT       | 7505na   | 15590na  |
| 1500 | 1600 |           | USA, KWHR Naalehu HI              | 9930as   |          |
| 1500 | 1600 |           | USA, Voice of America             | 4930af   | 6080af   |
|      |      |           | 7125va                            | 9645va   | 11890va  |
|      |      |           | 13735va                           | 15205va  | 15580af  |
| 1500 | 1600 |           | USA, WBCQ Kennebunk ME            | 9330na   |          |
| 1500 | 1600 |           | USA, WBOH Newport NC              | 5920am   |          |
| 1500 | 1600 |           | USA, WEWN Birmingham AL           | 9450na   |          |
| 1500 | 1600 |           | USA, WHRA Greenbush ME            | 15665na  |          |
| 1500 | 1600 |           | USA, WHRI Cypress Creek SC        | 9840am   | 11795am  |
|      |      |           | 13760am                           |          |          |
| 1500 | 1600 |           | USA, WINB Red Lion PA             | 13570am  |          |
| 1500 | 1600 |           | USA, WRMI Miami FL                | 9955na   |          |
| 1500 | 1600 |           | USA, WTJC Newport NC              | 9370na   |          |
| 1500 | 1600 |           | USA, WWCN Nashville TN            | 9985na   | 12160na  |
|      |      |           | 13845na                           | 15825na  |          |
| 1500 | 1600 |           | USA, WWRB Manchester TN           | 9385na   |          |
| 1500 | 1600 |           | USA, WYFR/Family R Okeechobee FL  | 6085as   |          |
|      |      |           | 11855na                           | 12010as  | 15210na  |
| 1500 | 1600 |           | Zambia, Christian Voice           | 4965af   |          |
| 1500 | 1600 | f DRM     | Taiwan, Radio Taiwan Intl         | 9770eu   |          |
| 1505 | 1600 |           | Canada, Radio Canada Intl         | 9610am   |          |
| 1505 | 1600 | DRM       | Canada, Radio Canada Intl         | 9800na   |          |
| 1515 | 1530 |           | Vatican City, Vatican Radio       | 11850va  | 13765va  |
| 1530 | 1545 |           | India, All India Radio            | 9425as   |          |
| 1530 | 1600 |           | Bangladesh, Bangla Betar          | 4750as   |          |
| 1530 | 1600 |           | Iran, Voice of the Islamic Rep    | 6160as   | 7330as   |
| 1530 | 1600 | mha       | UAE, AWR Africa                   | 9530as   |          |
| 1530 | 1600 |           | UK, Bible Voice                   | 12035as  |          |
| 1530 | 1600 |           | USA, Voice of America             | 6110va   | 7175va   |
|      |      |           | 9760va                            | 15460va  |          |
| 1530 | 1600 |           | Vatican City, Vatican Radio       | 9310va   | 11850va  |
|      |      |           | 13795va                           |          |          |
| 1545 | 1600 | s         | Germany, Pan American BC          | 13820me  |          |
| 1551 | 1600 | DRM       | New Zealand, Radio NZ Intl        | 9890pa   |          |
| 1551 | 1600 |           | New Zealand, Radio NZ Intl        | 9870pa   |          |

### 1600 UTC - 11AM EST / 10AM CST / 8AM PST

|      |      |         |                                  |         |         |
|------|------|---------|----------------------------------|---------|---------|
| 1600 | 1605 |         | Canada, Radio Canada Intl        | 9610am  |         |
| 1600 | 1605 | DRM     | Canada, Radio Canada Intl        | 9800na  |         |
| 1600 | 1615 |         | Pakistan, Radio                  | 6215va  | 7530va  |
| 1600 | 1620 | mtwh    | Moldova, Radio DMR Pridnestrovye |         | 6235eu  |
| 1600 | 1627 |         | Iran, Voice of the Islamic Rep   | 6160as  | 7330as  |
| 1600 | 1628 | s       | Hungary, Radio Budapest          | 6025eu  | 9565eu  |
| 1600 | 1628 |         | Vietnam, Voice of                | 7280va  | 9550va  |
|      |      |         | 11630va                          | 13860va | 9730va  |
| 1600 | 1630 | h       | Germany, Pan American BC         | 13820me |         |
| 1600 | 1630 |         | Guam, AWR/KSDA                   | 9585as  | 12065as |
| 1600 | 1630 |         | Myanmar, Radio                   | 9730do  |         |
| 1600 | 1630 | Sat/Sun | Swaziland, TWR                   | 6070af  |         |
| 1600 | 1630 |         | USA, Voice of America            | 11890va | 15205va |
| 1600 | 1640 | f       | Moldova, Radio DMR Pridnestrovye | 6235eu  |         |
| 1600 | 1658 |         | Germany, Deutsche Welle          | 6170as  | 9795as  |
|      |      |         | 11695as                          |         |         |
| 1600 | 1700 |         | Anguilla, University Network     | 11775am |         |
| 1600 | 1700 |         | Australia, CVC International     | 13635as |         |
| 1600 | 1700 |         | Australia, Radio                 | 5995va  | 6080va  |
|      |      |         | 9475as                           | 9710va  | 11660pa |
| 1600 | 1700 | a       | Canada, CBC NQ SW Service        | 9625na  |         |
| 1600 | 1700 |         | Canada, CFRX Toronto ON          | 6070na  |         |
| 1600 | 1700 |         | Canada, CFVP Calgary AB          | 6030na  |         |
| 1600 | 1700 |         | Canada, CKZN St John's NF        | 6160na  |         |
| 1600 | 1700 |         | Canada, CKZU Vancouver BC        | 6160na  |         |
| 1600 | 1700 |         | China, China Radio Intl          | 7150af  | 7255eu  |

|      |      |           |                                   |          |         |          |  |
|------|------|-----------|-----------------------------------|----------|---------|----------|--|
| 1600 | 1700 |           | 9435eu                            | 9525eu   | 9570af  |          |  |
| 1600 | 1700 |           | Costa Rica, University Network    | 11870va  | 13750va |          |  |
| 1600 | 1700 |           | Egypt, Radio Cairo                | 11740af  |         |          |  |
| 1600 | 1700 |           | Ethiopia, Radio                   | 5990af   | 7110af  | 7165af   |  |
|      |      |           | 9560af                            | 9704af   |         |          |  |
| 1600 | 1700 |           | France, Radio France Intl         | 7170af   | 9730af  |          |  |
|      |      |           | 11615af                           | 15160af  |         |          |  |
| 1600 | 1700 |           | Germany, CVC International        | 11705as  | 11830me |          |  |
| 1600 | 1700 | s         | Germany, Overcomer Ministries     |          | 17815na |          |  |
| 1600 | 1700 |           | Jordan, Radio                     | 11690na  |         |          |  |
| 1600 | 1700 |           | Malaysia, RTM/Trax FM             | 7295as   |         |          |  |
| 1600 | 1700 |           | New Zealand, Radio NZ Intl        | 9870pa   |         |          |  |
| 1600 | 1700 | DRM       | New Zealand, Radio NZ Intl        | 9890pa   |         |          |  |
| 1600 | 1700 |           | North Korea, Voice of Korea       | 9990va   | 11545af |          |  |
| 1600 | 1700 | vl        | Papua New Guinea, Wantok R. Light |          | 7120va  |          |  |
| 1600 | 1700 |           | Russia, Voice of                  | 4965as   | 4975as  | 6130eu   |  |
|      |      |           | 7260eu                            | 7305as   | 7320eu  |          |  |
| 1600 | 1700 |           | Taiwan, Radio Taiwan Intl         | 11550as  | 11955sa |          |  |
| 1600 | 1700 |           | UK, BBC World Service             | 3255af   | 3915af  |          |  |
|      |      |           | 5875eu                            | 5975as   | 6190af  | 6195as   |  |
|      |      |           | 7465eu                            | 9410eu   | 9740as  | 11665eu  |  |
|      |      |           | 11820eu                           | 11920as  | 12095eu | 15105af  |  |
|      |      |           | 15400af                           | 21470af  |         |          |  |
| 1600 | 1700 | DRM       | UK, BBC World Service             | 1296eu   | 5875eu  |          |  |
| 1600 | 1700 | vl/ mtwhf | UK, Sudan Radio Service           | 15575af  |         |          |  |
| 1600 | 1700 |           | USA, American Forces Radio        | 4319usb  | 5446usb |          |  |
|      |      |           | 5765usb                           | 6350usb  | 7811usb | 10320usb |  |
|      |      |           | 12133usb                          | 13362usb |         |          |  |
| 1600 | 1700 |           | USA, KAIJ Dallas TX               | 9480na   |         |          |  |
| 1600 | 1700 |           | USA, KJES Vado NM                 | 11715na  |         |          |  |
| 1600 | 1700 |           | USA, KTNB Salt Lake City UT       | 15590na  |         |          |  |
| 1600 | 1700 |           | USA, KWHR Naalehu HI              | 9930as   |         |          |  |
| 1600 | 1700 |           | USA, Voice of America             | 4930af   | 6080af  |          |  |
|      |      |           | 13600va                           | 13795af  | 15445va | 15580af  |  |
|      |      |           | 17640va                           | 17715af  | 17805af | 17895af  |  |
| 1600 | 1700 |           | USA, WBCQ Kennebunk ME            | 9330na   |         |          |  |
| 1600 | 1700 |           | USA, WBOH Newport NC              | 5920am   |         |          |  |
| 1600 | 1700 |           | USA, WEWN Birmingham AL           | 9450va   | 15785va |          |  |
| 1600 | 1700 |           | USA, WHRA Greenbush ME            | 17650na  |         |          |  |
| 1600 | 1700 |           | USA, WHRI Cypress Creek SC        | 9840am   | 15285am |          |  |
| 1600 | 1700 |           | USA, WINB Red Lion PA             | 13570am  |         |          |  |
| 1600 | 1700 | smtwhf    | USA, WMLK Bethel PA               | 9265eu   |         |          |  |
| 1600 | 1700 |           | USA, WRMI Miami FL                | 9955am   |         |          |  |
| 1600 | 1700 |           | USA, WTJC Newport NC              | 9370na   |         |          |  |
| 1600 | 1700 |           | USA, WWCR Nashville TN            | 9985na   | 12160na |          |  |
|      |      |           | 13845na                           | 15825na  |         |          |  |
| 1600 | 1700 |           | USA, WWRB Manchester TN           | 9385na   | 15250na |          |  |
| 1600 | 1700 |           | USA, WYFR/Family R Okeechobee FL  | 6085am   |         |          |  |
|      |      |           | 11830na                           | 12010as  | 13695na | 17690af  |  |
|      |      |           | 17760na                           | 18980va  | 21455va |          |  |
| 1600 | 1700 |           | Zambia, Christian Voice           | 4965af   |         |          |  |
| 1605 | 1620 | m         | Austria, Radio Austria Intl       | 13675na  |         |          |  |
| 1605 | 1630 | Sat/Sun   | Austria, Radio Austria Intl       | 13675na  |         |          |  |
| 1615 | 1630 | twhf      | Austria, Radio Austria Intl       | 13675ca  |         |          |  |
| 1615 | 1700 | Sat/Sun   | UK, BBC World Service             | 11860af  | 15420af |          |  |
|      |      |           | 17885af                           |          |         |          |  |
| 1630 | 1700 |           | Swaziland, TWR                    | 6070af   |         |          |  |
| 1630 | 1700 | Sat/Sun   | Swaziland, TWR                    | 6130af   |         |          |  |
| 1630 | 1700 | mtwhf     | UK, BBC World Service             |          | 15420af |          |  |
| 1630 | 1700 | s         | UK, Bible Voice                   | 9460me   |         |          |  |
| 1635 | 1700 | Sat/Sun   | Austria, Radio Austria Intl       | 134675na |         |          |  |
| 1640 | 1650 | mtwhf     | Turkmenistan, Turkmen Radio       | 4930eu   |         |          |  |
| 1640 | 1700 | mtwhf     | UK, Bible Voice                   | 9460me   |         |          |  |
| 1645 | 1700 | m         | Austria, Radio Austria Intl       | 13675na  |         |          |  |
| 1645 | 1700 | twhf      | Austria, Radio Austria Intl       | 13675na  |         |          |  |
| 1645 | 1700 | mtwhf     | Swaziland, TWR                    | 6130af   |         |          |  |
| 1645 | 1700 | f         | Sweden, IBRA Radio                | 7250as   |         |          |  |
| 1645 | 1700 |           | Tajikistan, Tajik Radio           | 7245as   |         |          |  |
| 1645 | 1700 | a         | UK, Bible Voice                   | 9460me   |         |          |  |

### 1700 UTC - 12PM EST / 11AM CST / 9AM PST

|      |      |       |                                  |         |         |         |  |
|------|------|-------|----------------------------------|---------|---------|---------|--|
| 1700 | 1715 | mtwhf | Swaziland, TWR                   | 6130af  |         |         |  |
| 1700 | 1715 | mtwhf | UK, Bible Voice                  | 9460me  |         |         |  |
| 1700 | 1720 | mtwhf | Moldova, Radio DMR Pridnestrovye |         | 6235eu  |         |  |
| 1700 | 1727 |       | Czech Rep, Radio Prague          | 5930eu  | 15710af |         |  |
| 1700 | 1730 |       | France, Radio France Intl        | 11615af |         |         |  |
| 1700 | 1730 |       | Germany, Deutsche Welle          | 3995eu  |         |         |  |
| 1700 | 1730 |       | Jordan, Radio                    | 11690na |         |         |  |
| 1700 | 1730 | mtwhf | UK, United Nations Radio         | 7170va  | 9565va  |         |  |
|      |      |       | 17810va                          |         |         |         |  |
| 1700 | 1740 | f     | Moldova, Radio DMR Pridnestrovye |         | 6235eu  |         |  |
| 1700 | 1745 |       | UK, BBC World Service            | 6005af  | 9630af  |         |  |
| 1700 | 1750 |       | New Zealand, Radio NZ Intl       | 9870pa  |         |         |  |
| 1700 | 1750 | DRM   | New Zealand, Radio NZ Intl       | 9890pa  |         |         |  |
| 1700 | 1800 |       | Anguilla, University Network     | 11775am |         |         |  |
| 1700 | 1800 |       | Australia, CVC International     | 13635as |         |         |  |
| 1700 | 1800 |       | Australia, Radio                 | 5995va  | 6080va  | 7240as  |  |
|      |      |       | 9475as                           | 9580va  | 9710va  | 11660pa |  |
|      |      |       | 11880pa                          |         |         |         |  |
| 1700 | 1800 | a     | Canada, CBC NQ SW Service        | 9625na  |         |         |  |
| 1700 | 1800 |       | Canada, CFRX Toronto ON          | 6070na  |         |         |  |

|      |      |           |                                   |          |         |          |  |
|------|------|-----------|-----------------------------------|----------|---------|----------|--|
| 1700 | 1800 |           | Canada, CFVP Calgary AB           | 6030na   |         |          |  |
| 1700 | 1800 |           | Canada, CKZN St John's NF         | 6160na   |         |          |  |
| 1700 | 1800 |           | Canada, CKZU Vancouver BC         | 6160na   |         |          |  |
| 1700 | 1800 |           | China, China Radio Intl           | 7150af   | 7205eu  |          |  |
|      |      |           | 7255eu                            | 9570af   |         |          |  |
| 1700 | 1800 |           | Costa Rica, University Network    | 11870va  | 13750va |          |  |
| 1700 | 1800 |           | Egypt, Radio Cairo                | 11740af  |         |          |  |
| 1700 | 1800 | s         | Germany, Universal Life           |          | 5775va  |          |  |
| 1700 | 1800 | fs        | Italy, IRRS                       | 9310va   |         |          |  |
| 1700 | 1800 |           | Japan, Radio Japan/NHK World      |          | 9535va  |          |  |
|      |      |           | 11970eu                           | 15355af  |         |          |  |
| 1700 | 1800 | DRM       | Japan, Radio Japan/NHK World      |          | 9770eu  |          |  |
| 1700 | 1800 |           | Malaysia, RTM/Trax FM             | 7295as   |         |          |  |
| 1700 | 1800 |           | Nigeria, Voice of                 | 15120af  |         |          |  |
| 1700 | 1800 | vl        | Papua New Guinea, Wantok R. Light |          | 7120va  |          |  |
| 1700 | 1800 |           | Russia, Voice of                  | 6125as   | 7125as  | 7270va   |  |
|      |      |           | 7320eu                            | 9470me   |         |          |  |
| 1700 | 1800 |           | South Africa, Channel Africa      |          | 15235af |          |  |
| 1700 | 1800 |           | Swaziland, TWR                    | 3200af   |         |          |  |
| 1700 | 1800 |           | Taiwan, Radio Taiwan Intl         | 11850af  |         |          |  |
| 1700 | 1800 | DRM       | UK, BBC World Service             | 1296eu   | 5875eu  |          |  |
| 1700 | 1800 |           | UK, BBC World Service             | 3255af   | 3915as  |          |  |
|      |      |           | 5975as                            | 6190af   | 6195eu  | 7465eu   |  |
|      |      |           | 9410eu                            | 9740as   | 11665eu | 11955as  |  |
|      |      |           | 12095af                           | 15400af  | 21470af |          |  |
| 1700 | 1800 | Sat/Sun   | UK, Bible Voice                   | 9460me   |         |          |  |
| 1700 | 1800 | vl/ mtwhf | UK, Sudan Radio Service           |          | 11705af |          |  |
| 1700 | 1800 |           | USA, American Forces Radio        | 4319usb  | 5446usb |          |  |
|      |      |           | 5765usb                           | 6350usb  | 7811usb | 10320usb |  |
|      |      |           | 12133usb                          | 13362usb |         |          |  |
| 1700 | 1800 |           | USA, KAIJ Dallas TX               | 9480na   |         |          |  |
| 1700 | 1800 |           | USA, KTNB Salt Lake City UT       | 15590na  |         |          |  |
| 1700 | 1800 |           | USA, KWHR Naalehu HI              | 9930as   |         |          |  |
| 1700 | 1800 |           | USA, Voice of America             | 6080af   | 13710af |          |  |
|      |      |           | 15580af                           |          |         |          |  |
| 1700 | 1800 | Sat/Sun   | USA, Voice of America             | 4930af   |         |          |  |
| 1700 | 1800 |           | USA, WBCQ Kennebunk ME            | 9330na   | 18910na |          |  |
| 1700 | 1800 |           | USA, WBOH Newport NC              | 5920am   |         |          |  |
| 1700 | 1800 |           | USA, WEWN Birmingham AL           | 9450va   | 15785va |          |  |
| 1700 | 1800 |           | USA, WHRA Greenbush ME            | 17650na  |         |          |  |
| 1700 | 1800 |           | USA, WHRI Cypress Creek SC        | 9840am   | 15285am |          |  |
|      |      |           | 15650am                           |          |         |          |  |
| 1700 | 1800 |           | USA, WINB Red Lion PA             | 13570am  |         |          |  |
| 1700 | 1800 | smtwhf    | USA, WMLK Bethel PA               | 9265eu   |         |          |  |
| 1700 | 1800 |           | USA, WRMI Miami FL                | 9955am   |         |          |  |
| 1700 | 1800 |           | USA, WTJC Newport NC              | 9370na   |         |          |  |
| 1700 | 1800 |           | USA, WWCR Nashville TN            | 9985na   | 12160na |          |  |
|      |      |           | 13845na                           | 15825na  |         |          |  |
| 1700 | 1800 |           | USA, WWRB Manchester TN           | 9385na   | 15250na |          |  |
| 1700 | 1800 |           | USA, WYFR/Family R Okeechobee FL  | 13695na  |         |          |  |
|      |      |           | 17555na                           | 21680na  |         |          |  |
| 1700 | 1800 |           | Zambia, Christian Voice           | 4965af   |         |          |  |
| 1705 | 1800 |           | Canada, Radio Canada Intl         | 9610am   |         |          |  |
| 1705 | 1800 | DRM       | Canada, Radio Canada Intl         | 9800na   |         |          |  |
| 1715 | 1730 |           | Vatican City, Vatican Radio       | 4005eu   | 7250eu  |          |  |
|      |      |           | 9635eu                            | 9645eu   |         |          |  |
| 1715 | 1800 | t         | UK, Bible Voice                   | 9460me   |         |          |  |
| 1730 | 1800 |           | Guam, AWR/KSDA                    | 9980me   |         |          |  |
| 1730 | 1800 |           | Liberia, ELWA                     | 4760do   |         |          |  |
| 1730 | 1800 |           | Philippines, Radio Pilipinas      |          | 11720va | 15190va  |  |
|      |      |           | 17720va                           |          |         |          |  |
| 1730 | 1800 |           | Slovakia, Radio Slovakia Int      | 5915eu   | 6055eu  |          |  |
| 1730 | 1800 |           | Swaziland, TWR                    | 9500af   |         |          |  |
| 1730 | 1800 | s         | UK, Bible Voice                   | 9730me   |         |          |  |
| 1730 | 1800 |           | USA, Voice of America             | 4930af   | 11815af |          |  |
| 1730 | 1800 |           | Vatican City, Vatican Radio       | 9755af   | 11625af |          |  |
|      |      |           | 13795af                           |          |         |          |  |
| 1730 | 1800 | mtwhf     | YSA, Voice of America             | 17730af  |         |          |  |
| 1745 | 1800 |           | India, All India Radio            | 7410eu   | 9445af  |          |  |
|      |      |           | 9950eu                            | 11620eu  | 11935af | 13605af  |  |
|      |      |           | 15075af                           | 15155af  | 17670af |          |  |
| 1751 | 1800 |           | New Zealand, Radio NZ Intl        | 11725pa  |         |          |  |
| 1751 | 1800 | DRM       | New Zealand, Radio NZ Intl        | 11675pa  |         |          |  |

### 1800 UTC - 1PM EST / 12PM CST / 10AM PST

|      |      |         |                              |         |         |        |  |
|------|------|---------|------------------------------|---------|---------|--------|--|
| 1800 | 1815 | t       | UK, Bible Voice              | 9460me  |         |        |  |
| 1800 | 1815 | a       | UK, Bible Voice              | 7210me  |         |        |  |
| 1800 | 1827 |         | Czech Rep, Radio Prague      |         | 5930eu  | 9400va |  |
| 1800 | 1828 |         | Vietnam, Voice of            | 5955eu  | 7280va  | 9730va |  |
| 1800 | 1830 |         | South Africa, AWR Africa     |         | 3215af  | 3345af |  |
|      |      |         | 11830af                      |         |         |        |  |
| 1800 | 1830 |         | UK, BBC World Service        | 9740as  |         |        |  |
| 1800 | 1830 | Sat/Sun | USA, Voice of America        | 4930af  |         |        |  |
| 1800 | 1830 |         | USA, Voice of America        | 6080af  | 11975af |        |  |
|      |      |         | 13710af                      | 15580af | 17895af |        |  |
| 1800 | 1850 | DRM     | New Zealand, Radio NZ Intl   | 11675pa |         |        |  |
| 1800 | 1856 |         | Romania, Radio Romania Intl  | 7120eu  | 9640eu  |        |  |
| 1800 | 1857 |         | Netherlands, Radio           | 6020af  | 7395af  |        |  |
|      |      |         | 9895af                       | 11655af |         |        |  |
| 1800 | 1859 |         | Poland, Radio Polonia        | 6015eu  | 7130eu  |        |  |
| 1800 | 1900 |         | Anguilla, University Network | 11775am |         |        |  |



|      |      |         |                                   |          |         |         |         |
|------|------|---------|-----------------------------------|----------|---------|---------|---------|
| 1800 | 1900 | mtwhf   | Argentina, RAE                    | 9690eu   | 15345eu |         |         |
| 1800 | 1900 |         | Australia, Radio                  | 6080va   | 7240as  | 9475as  |         |
|      |      |         | 9500as                            | 9580va   | 9710va  | 11880pa |         |
| 1800 | 1900 |         | Canada, CFRX Toronto ON           |          | 6070na  |         |         |
| 1800 | 1900 |         | Canada, CFVP Calgary AB           |          | 6030na  |         |         |
| 1800 | 1900 |         | Canada, CKZN St John's NF         |          | 6160na  |         |         |
| 1800 | 1900 |         | Canada, CKZU Vancouver BC         |          | 6160na  |         |         |
| 1800 | 1900 |         | Canada, Radio Canada Intl         |          | 7185af  | 9610am  |         |
|      |      |         | 11875af                           | 13650af  | 15365af | 17740af |         |
| 1800 | 1900 | DRM     | Canada, Radio Canada Intl         |          | 9800na  |         |         |
| 1800 | 1900 |         | China, China Radio Intl           |          | 6100eu  | 7100eu  |         |
| 1800 | 1900 |         | Costa Rica, University Network    |          | 11870va | 13750va |         |
| 1800 | 1900 |         | Germany, Universal Life           |          | 5775va  |         |         |
| 1800 | 1900 |         | India, All India Radio            |          | 7410eu  | 9445af  |         |
|      |      |         | 9950eu                            | 11620eu  | 11935af | 13605af |         |
|      |      |         | 15075af                           | 15155af  | 17670af |         |         |
| 1800 | 1900 | fs      | Italy, IRRS                       |          | 9310va  |         |         |
| 1800 | 1900 |         | Liberia, ELWA                     |          | 4760do  |         |         |
| 1800 | 1900 |         | Malaysia, RTM/Trax FM             |          | 7295as  |         |         |
| 1800 | 1900 |         | New Zealand, Radio NZ Intl        |          | 11725pa |         |         |
| 1800 | 1900 |         | North Korea, Voice of Korea       |          | 7570eu  | 12015eu |         |
| 1800 | 1900 | vi      | Papua New Guinea, Wantok R. Light |          | 7120va  |         |         |
| 1800 | 1900 |         | Philippines, Radio Pilipinas      |          | 11720va | 15190va |         |
|      |      |         | 17720va                           |          |         |         |         |
| 1800 | 1900 |         | Russia, Voice of                  |          | 6125as  | 7105eu  | 7125as  |
|      |      |         | 7270va                            | 7295as   | 7320eu  | 11510af |         |
| 1800 | 1900 | Sat/Sun | Russia, Voice of                  |          | 6055eu  | 6175eu  |         |
| 1800 | 1900 |         | Swaziland, TWR                    |          | 3200af  | 9500af  |         |
| 1800 | 1900 |         | Taiwan, Radio Taiwan Intl         |          | 3965eu  |         |         |
| 1800 | 1900 | DRM     | UK, BBC World Service             |          | 1296eu  | 5970eu  |         |
| 1800 | 1900 |         | UK, BBC World Service             |          | 3255af  | 5875eu  |         |
|      |      |         | 5955as                            | 6190af   | 6195eu  | 7465eu  |         |
|      |      |         | 9410eu                            | 11955as  | 12095af | 15400af |         |
|      |      |         | 17830af                           | 21470af  |         |         |         |
| 1800 | 1900 | a       | UK, Bible Voice                   |          | 9730me  |         |         |
| 1800 | 1900 |         | USA, American Forces Radio        |          | 5765usb | 6350usb | 7811usb |
|      |      |         | 12133usb                          | 13362usb |         |         |         |
| 1800 | 1900 |         | USA, KAIJ Dallas TX               |          | 9480na  |         |         |
| 1800 | 1900 |         | USA, KTNB Salt Lake City UT       |          | 15590na |         |         |
| 1800 | 1900 | smtwhf  | USA, WBCQ Kennebunk ME            |          | 7415na  |         |         |
| 1800 | 1900 |         | USA, WBCQ Kennebunk ME            |          | 9330na  | 18910na |         |
| 1800 | 1900 |         | USA, WBOH Newport NC              |          | 5920am  |         |         |
| 1800 | 1900 |         | USA, WEWN Birmingham AL           |          | 9450va  | 15785va |         |
| 1800 | 1900 |         | USA, WHRA Greenbush ME            |          | 17650na |         |         |
| 1800 | 1900 |         | USA, WHRI Cypress Creek SC        |          | 9840am  | 15285am |         |
|      |      |         | 15650am                           |          |         |         |         |
| 1800 | 1900 |         | USA, WINB Red Lion PA             |          | 13570am |         |         |
| 1800 | 1900 | smtwhf  | USA, WMLK Bethel PA               |          | 9265eu  |         |         |
| 1800 | 1900 |         | USA, WRMI Miami FL                |          | 9955am  |         |         |
| 1800 | 1900 |         | USA, WTJC Newport NC              |          | 9370na  |         |         |
| 1800 | 1900 |         | USA, WWCR Nashville TN            |          | 9985na  | 12160na |         |
|      |      |         | 13845na                           | 15825na  |         |         |         |
| 1800 | 1900 |         | USA, WWRB Manchester TN           |          | 9385na  | 15250na |         |
| 1800 | 1900 |         | USA, WYFR/Family R Okeechobee FL  |          | 7345va  | 13695na | 17535na |
|      |      |         | 18980va                           |          |         |         |         |
| 1800 | 1900 |         | Yemen, Rep of Yemen Radio         |          | 9780me  |         |         |
| 1800 | 1900 |         | Zambia, Christian Voice           |          | 4965af  |         |         |
| 1815 | 1900 |         | Bangladesh, Bangla Betar          |          | 7185eu  |         |         |
| 1830 | 1845 |         | Israel, Kol Israel                |          | 6985va  | 7545va  | 9345eu  |
| 1830 | 1845 |         | Sweden, IBRA Radio                |          | 9529af  |         |         |
| 1830 | 1900 |         | Bulgaria, Radio                   |          | 7400eu  | 9400eu  |         |
| 1830 | 1900 |         | Sweden, Radio                     |          | 6065eu  |         |         |
| 1830 | 1900 |         | Turkey, Voice of                  |          | 6060eu  |         |         |
| 1830 | 1900 |         | UK, BBC World Service             |          | 6005af  | 9630af  |         |
| 1830 | 1900 | s       | UK, Bible Voice                   |          | 9730me  |         |         |
| 1830 | 1900 | h       | UK, Bible Voice                   |          | 9460me  |         |         |
| 1830 | 1900 |         | USA, Voice of America             |          | 4930af  | 6080af  |         |
|      |      |         | 11975af                           | 13710af  | 15580af | 17895af |         |
| 1845 | 1900 | mtwhfa  | Albania, Radio Tirana             |          | 6170eu  |         |         |
| 1845 | 1900 |         | Congo, RTV Congolaise             |          | 4765af  | 5985af  |         |
| 1845 | 1900 | a       | UK, Bible Voice                   |          | 7210me  |         |         |
| 1851 | 1900 | DRM     | New Zealand, Radio NZ Intl        |          | 15720pa |         |         |

### 1900 UTC - 2PM EST / 1PM CST / 11AM PST

|      |      |     |                              |         |         |         |  |
|------|------|-----|------------------------------|---------|---------|---------|--|
| 1900 | 1905 |     | Canada, Radio Canada Intl    |         | 9610am  |         |  |
| 1900 | 1905 | DRM | Canada, Radio Canada Intl    |         | 9800na  |         |  |
| 1900 | 1915 |     | Congo, RTV Congolaise        |         | 4765af  | 5985af  |  |
| 1900 | 1928 |     | Vietnam, Voice of            |         | 7280va  |         |  |
| 1900 | 1930 |     | Germany, Deutsche Welle      |         | 7245af  | 9735af  |  |
|      |      |     | 11690af                      | 12025af | 15275af |         |  |
| 1900 | 1930 | s   | Germany, Universal Life      |         | 5775me  |         |  |
| 1900 | 1930 |     | Philippines, Radio Pilipinas |         | 11720va | 15190va |  |
|      |      |     | 17720va                      |         |         |         |  |
| 1900 | 1930 | s   | UK, Bible Voice              |         | 6015eu  |         |  |
| 1900 | 1930 | a   | UK, Bible Voice              |         | 7260af  | 9460me  |  |
| 1900 | 1945 |     | India, All India Radio       |         | 7410eu  | 9445af  |  |
|      |      |     | 9950eu                       | 11620eu | 11935af | 13605af |  |
|      |      |     | 15075af                      | 15155af | 17670af |         |  |
| 1900 | 1950 | DRM | New Zealand, Radio NZ Intl   |         | 15720pa |         |  |

|      |      |           |                                    |          |         |         |         |
|------|------|-----------|------------------------------------|----------|---------|---------|---------|
| 1900 | 1950 |           | New Zealand, Radio NZ Intl         |          | 11725pa |         |         |
| 1900 | 1957 |           | Netherlands, Radio                 |          | 7120af  | 7395af  |         |
|      |      |           | 9895af                             | 11655af  | 17725na | 17810af |         |
| 1900 | 1957 | Sat/Sun   | Netherlands, Radio                 |          | 15315na | 15525na |         |
|      |      |           | 15525na                            | 17725na  |         |         |         |
| 1900 | 2000 |           | Anguilla, University Network       |          | 11775am |         |         |
| 1900 | 2000 |           | Australia, Radio                   |          | 6080va  | 7240as  | 9500as  |
|      |      |           | 9580va                             | 9710va   | 11880pa |         |         |
| 1900 | 2000 |           | Canada, CFRX Toronto ON            |          | 6070na  |         |         |
| 1900 | 2000 |           | Canada, CFVP Calgary AB            |          | 6030na  |         |         |
| 1900 | 2000 |           | Canada, CKZN St John's NF          |          | 6160na  |         |         |
| 1900 | 2000 |           | Canada, CKZU Vancouver BC          |          | 6160na  |         |         |
| 1900 | 2000 |           | China, China Radio Intl            |          | 7295va  | 9440va  |         |
| 1900 | 2000 |           | Costa Rica, University Network     |          | 11870va | 13750va |         |
| 1900 | 2000 |           | Egypt, Radio Cairo                 |          | 15375af |         |         |
| 1900 | 2000 |           | Eqt Guinea, Radio Africa           |          | 15190af |         |         |
| 1900 | 2000 | vi        | Ghana, Ghana BC Corp               |          | 3366do  | 4915do  |         |
| 1900 | 2000 |           | Italy, IRRS                        |          | 9310va  |         |         |
| 1900 | 2000 |           | Liberia, ELWA                      |          | 4760do  |         |         |
| 1900 | 2000 |           | Malaysia, RTM/Trax FM              |          | 7295as  |         |         |
| 1900 | 2000 | vi        | Namibia, Namibian BC Corp          |          | 3270do  | 3290do  |         |
|      |      |           | 6060do                             | 6175do   |         |         |         |
| 1900 | 2000 |           | Nigeria, Radio/Ibadan              |          | 6050do  |         |         |
| 1900 | 2000 |           | Nigeria, Radio/Kaduna              |          | 4770do  | 6090do  |         |
| 1900 | 2000 |           | Nigeria, Radio/Lagos               |          | 3326do  | 4990do  |         |
| 1900 | 2000 |           | Nigeria, Voice of                  |          | 15120af |         |         |
| 1900 | 2000 |           | North Korea, Voice of Korea        |          | 7100af  | 9975va  |         |
|      |      |           | 11535va                            |          |         |         |         |
| 1900 | 2000 |           | Papua New Guinea, Catholic Radio   |          |         | 4960do  |         |
| 1900 | 2000 |           | Papua New Guinea, NBC              |          | 4890do  |         |         |
| 1900 | 2000 | vi        | Papua New Guinea, Wantok R. Light  |          | 7120va  |         |         |
| 1900 | 2000 |           | Russia, Voice of                   |          | 6175eu  | 7105eu  | 7290eu  |
|      |      |           | 7335af                             | 11510af  |         |         |         |
| 1900 | 2000 | irreg/ vi | Sierra Leone, SLBS 3316do          |          |         |         |         |
| 1900 | 2000 | vi        | Solomon Islands, SIBC              |          | 5020do  | 9545do  |         |
| 1900 | 2000 | vi        | South Africa, Channel Africa       |          | 3345af  |         |         |
| 1900 | 2000 |           | South Korea, KBS World Radio       |          |         | 7275eu  |         |
| 1900 | 2000 |           | Swaziland, TWR                     |          | 3200af  |         |         |
| 1900 | 2000 |           | Thailand, Radio                    |          | 7155eu  |         |         |
| 1900 | 2000 | vi        | Uganda, Radio                      |          | 4976do  | 5026do  |         |
| 1900 | 2000 | DRM       | UK, BBC World Service              |          | 1296do  |         |         |
| 1900 | 2000 |           | UK, BBC World Service              |          | 3255af  | 5875eu  |         |
|      |      |           | 5955as                             | 6005af   | 6190af  | 6195eu  |         |
|      |      |           | 9410eu                             | 9630af   | 11955as | 12095af |         |
|      |      |           | 15400af                            | 17830af  |         |         |         |
| 1900 | 2000 | Sat/Sun   | UK, Bible Voice                    |          | 9470me  |         |         |
| 1900 | 2000 |           | USA, American Forces Radio         |          | 5765usb | 6350usb | 7811usb |
|      |      |           | 12133usb                           | 13362usb |         |         |         |
| 1900 | 2000 |           | USA, KAIJ Dallas TX                |          | 9480na  |         |         |
| 1900 | 2000 |           | USA, KJES Vado NM                  |          | 15385na |         |         |
| 1900 | 2000 |           | USA, KTNB Salt Lake City UT        |          | 15590na |         |         |
| 1900 | 2000 |           | USA, Voice of America              |          | 4930af  | 4940af  |         |
|      |      |           | 6080af                             | 11975af  | 13710af | 15580af |         |
| 1900 | 2000 |           | USA, WBCQ Kennebunk ME             |          | 7415na  | 9330na  |         |
|      |      |           | 18910na                            |          |         |         |         |
| 1900 | 2000 |           | USA, WBOH Newport NC               |          | 5920am  |         |         |
| 1900 | 2000 |           | USA, WEWN Birmingham AL            |          | 9450va  | 15785va |         |
| 1900 | 2000 |           | USA, WHRA Greenbush ME             |          | 17650na |         |         |
| 1900 | 2000 |           | USA, WHRI Cypress Creek SC         |          | 9840am  | 13760am |         |
|      |      |           | 15285am                            |          |         |         |         |
| 1900 | 2000 |           | USA, WINB Red Lion PA              |          | 13570am |         |         |
| 1900 | 2000 | smtwhf    | USA, WMLK Bethel PA                |          | 9265eu  |         |         |
| 1900 | 2000 |           | USA, WRMI Miami FL                 |          | 9955am  |         |         |
| 1900 | 2000 |           | USA, WTJC Newport NC               |          | 9370na  |         |         |
| 1900 | 2000 |           | USA, WWCR Nashville TN             |          | 9975na  | 12160na |         |
|      |      |           | 13845na                            | 15825na  |         |         |         |
| 1900 | 2000 |           | USA, WWRB Manchester TN            |          | 9385na  | 15250na |         |
| 1900 | 2000 |           | USA, WYFR/Family R Okeechobee FL   |          | 7345va  | 13695na | 17535na |
|      |      |           | 6020af                             | 6085am   | 7160va  | 7395af  |         |
|      |      |           | 13695na                            | 15115af  | 15565va | 17535na |         |
|      |      |           | 17555na                            | 18980va  |         |         |         |
| 1900 | 2000 |           | Zambia, Christian Voice            |          | 4965af  |         |         |
| 1900 | 2000 | vi        | Zimbabwe, ZBC Corp                 |          | 5975do  |         |         |
| 1915 | 2000 | f         | UK, Bible Voice                    |          | 9470me  |         |         |
| 1930 | 2000 | Sat/Sun   | Germany, Pan American BC           |          | 5850me  |         |         |
| 1930 | 2000 |           | Iran, Voice of the Islamic Rep     |          | 6010eu  | 6255va  |         |
|      |      |           | 7320af                             | 9855af   | 11695af |         |         |
| 1930 | 2000 |           | Lithuania, Radio Vilnius           |          | 6250eu  |         |         |
| 1930 | 2000 |           | Serbia, International Radio Serbia |          |         | 6100eu  |         |
| 1930 | 2000 |           | Slovakia, Radio Slovakia Int       |          | 5915eu  | 7345eu  |         |
| 1930 | 2000 |           | Turkey, Voice of                   |          | 6060eu  |         |         |
| 1930 | 2000 | s         | UK, Bible Voice                    |          | 7260af  |         |         |
| 1935 | 1955 |           | Italy, RAI Intl                    |          | 6035eu  | 9760eu  |         |
| 1945 | 2000 | mtwhfa    | Albania, Radio Tirana              |          | 7465eu  |         |         |
| 1945 | 2000 | vi        | Rwanda, Radio                      |          | 6055do  |         |         |
| 1945 | 2000 | a         | UK, Bible Voice                    |          | 6015va  |         |         |
| 1945 | 2000 |           | Vatican City, Vatican Radio        |          | 9800am  |         |         |
| 1951 | 2000 | DRM       | New Zealand, Radio NZ Intl         |          | 11675pa |         |         |
| 1951 | 2000 |           | New Zealand, Radio NZ Intl         |          | 17675pa |         |         |

### 2000 UTC - 3PM EST / 2PM CST / 12PM PST

|      |      |         |                                   |          |          |
|------|------|---------|-----------------------------------|----------|----------|
| 2000 | 2015 | s       | Germany, Pan American BC          | 5850me   |          |
| 2000 | 2015 | a       | UK, Bible Voice                   | 6015va   |          |
| 2000 | 2025 |         | Israel, Kol Israel                | 6280va   | 15640va  |
| 2000 | 2027 |         | Iran, Voice of the Islamic Rep    | 6010eu   | 6255va   |
|      |      |         | 7320af                            | 9855af   | 11695af  |
| 2000 | 2028 |         | Hungary, Radio Budapest           | 3975eu   | 6025eu   |
| 2000 | 2030 |         | Egypt, Radio Cairo                | 15375af  |          |
| 2000 | 2030 | f       | Germany, Pan American BC          | 5850me   |          |
| 2000 | 2030 |         | Lithuania, Radio Vilnius          | 6250eu   |          |
| 2000 | 2030 |         | Mongolia, Voice of 12015eu        |          |          |
| 2000 | 2030 |         | South Africa, AWR Africa          | 9655af   |          |
| 2000 | 2030 |         | Swaziland, TWR                    | 3200af   |          |
| 2000 | 2030 |         | Turkey, Voice of                  | 6060eu   |          |
| 2000 | 2030 | s       | UK, Bible Voice                   | 6015va   |          |
| 2000 | 2030 |         | Vatican City, Vatican Radio       | 7365af   | 9755af   |
|      |      |         | 11625af                           |          |          |
| 2000 | 2057 |         | Germany, Deutsche Welle           | 6145af   | 9735af   |
|      |      |         | 9830af                            | 12025af  | 15275af  |
| 2000 | 2057 |         | Netherlands, Radio                | 7120af   | 11655af  |
|      |      |         | 15525na                           | 17725na  | 17810af  |
| 2000 | 2057 | Sat/Sun | Netherlands, Radio                | 15315na  | 15525na  |
|      |      |         | 17725na                           |          |          |
| 2000 | 2059 | mtwhf   | Spain, Radio Exterior Espana      | 9680af   | 11680af  |
| 2000 | 2100 |         | Anguilla, University Network      | 11775am  |          |
| 2000 | 2100 |         | Australia, ABC NT Alice Springs   |          | 2310do   |
|      |      |         | 4835do                            |          |          |
| 2000 | 2100 |         | Australia, ABC NT Katherine       | 2485do   |          |
| 2000 | 2100 |         | Australia, ABC NT Tennant Creek   |          | 2325do   |
| 2000 | 2100 |         | Australia, Radio                  | 6080va   | 7240as   |
|      |      |         | 11650pa                           | 11660pa  | 11880pa  |
| 2000 | 2100 |         | Belarus, Radio                    | 7360eu   | 7390eu   |
| 2000 | 2100 |         | Canada, CFRX Toronto ON           | 6070na   |          |
| 2000 | 2100 |         | Canada, CFVP Calgary AB           | 6030na   |          |
| 2000 | 2100 |         | Canada, CKZN St John's NF         | 6160na   |          |
| 2000 | 2100 |         | Canada, CKZU Vancouver BC         | 6160na   |          |
| 2000 | 2100 |         | China, China Radio Intl           | 5960eu   | 7170eu   |
|      |      |         | 7190eu                            | 7285eu   | 7295va   |
|      |      |         | 9440va                            | 9600eu   | 11640af  |
| 2000 | 2100 |         | Costa Rica, University Network    | 13750va  |          |
| 2000 | 2100 |         | Eat Guinea, Radio Africa          | 15190af  |          |
| 2000 | 2100 | vl      | Ghana, Ghana BC Corp              | 3366do   | 4915do   |
| 2000 | 2100 |         | Indonesia, Voice of               | 9525eu   | 11785eu  |
|      |      |         | 15150al                           |          |          |
| 2000 | 2100 |         | Italy, IRRS                       | 5775eu   |          |
| 2000 | 2100 |         | Liberia, ELWA                     | 4760do   |          |
| 2000 | 2100 |         | Malaysia, RTM/Trax FM             | 7295as   |          |
| 2000 | 2100 | vl      | Namibia, Namibian BC Corp         | 3270do   | 3290do   |
|      |      |         | 6060do                            | 6175do   |          |
| 2000 | 2100 |         | New Zealand, Radio NZ Intl        | 17675pa  |          |
| 2000 | 2100 |         | Nigeria, Radio/Ibadan             | 6050do   |          |
| 2000 | 2100 |         | Nigeria, Radio/Kaduna             | 4770do   | 6090do   |
| 2000 | 2100 |         | Nigeria, Radio/Lagos              | 3326do   | 4990do   |
| 2000 | 2100 |         | Nigeria, Voice of                 | 15120af  |          |
| 2000 | 2100 |         | Papua New Guinea, Catholic Radio  |          | 4960do   |
| 2000 | 2100 |         | Papua New Guinea, NBC             | 4890do   |          |
| 2000 | 2100 | vl      | Papua New Guinea, Wantok R. Light |          | 7120va   |
| 2000 | 2100 |         | Russia, Voice of                  | 5955as   | 6145eu   |
|      |      |         | 7290eu                            | 7330eu   | 7105eu   |
| 2000 | 2100 | vl      | Solomon Islands, SIBC             | 5020do   | 9545do   |
| 2000 | 2100 | vl      | South Africa, Channel Africa      | 3345af   |          |
| 2000 | 2100 | vl      | Uganda, Radio                     | 4976do   | 5026do   |
| 2000 | 2100 | DRM     | UK, BBC World Service             | 1296eu   |          |
| 2000 | 2100 |         | UK, BBC World Service             | 3255af   | 5875eu   |
|      |      |         | 6005af                            | 6190af   | 6195eu   |
|      |      |         | 12095af                           | 15400af  | 17830af  |
| 2000 | 2100 |         | USA, American Forces Radio        | 4319usb  | 5446usb  |
|      |      |         | 5765usb                           | 6350usb  | 7811usb  |
|      |      |         | 12133usb                          | 13362usb | 10320usb |
| 2000 | 2100 |         | USA, KAIJ Dallas TX               | 9480na   |          |
| 2000 | 2100 |         | USA, KJES Vado NM                 | 15385na  |          |
| 2000 | 2100 |         | USA, KTBN Salt Lake City UT       | 15590na  |          |
| 2000 | 2100 |         | USA, WBCQ Kennebunk ME            | 7415na   | 9330na   |
|      |      |         | 18910na                           |          |          |
| 2000 | 2100 |         | USA, WBOH Newport NC              | 5920am   |          |
| 2000 | 2100 |         | USA, WEWN Birmingham AL           | 9450va   | 15785va  |
| 2000 | 2100 |         | USA, WHRI Cypress Creek SC        | 11765am  | 15285am  |
| 2000 | 2100 |         | USA, WINB Red Lion PA             | 13570am  |          |
| 2000 | 2100 | smtwhf  | USA, WMLK Bethel PA               | 9265eu   |          |
| 2000 | 2100 |         | USA, WRMI Miami FL                | 9955am   |          |
| 2000 | 2100 |         | USA, WTJC Newport NC              | 9370na   |          |
| 2000 | 2100 |         | USA, WWCN Nashville TN            | 9975na   | 12160na  |
|      |      |         | 13845na                           | 15825na  |          |
| 2000 | 2100 |         | USA, WWRB Manchester TN           | 9385na   | 15250na  |
| 2000 | 2100 |         | USA, WYFR/Family R Okeechobee FL  |          | 3230af   |
|      |      |         | 5745va                            | 5810va   | 6855va   |
|      |      |         | 7580va                            | 15115af  | 15195af  |
| 2000 | 2100 |         | Zambia, Christian Voice           | 4965af   |          |
| 2000 | 2100 | vl      | Zimbabwe, ZBC Corp                | 5975do   |          |
| 2005 | 2100 |         | Syria, Radio Damascus             | 9330eu   | 12085eu  |
| 2025 | 2045 |         | Italy, RAI Intl                   | 6010va   |          |
| 2030 | 2045 |         | Thailand, Radio                   | 9535eu   |          |

|      |      |         |                             |         |         |         |
|------|------|---------|-----------------------------|---------|---------|---------|
| 2030 | 2058 |         | Vietnam, Voice of           | 7280va  | 9550va  | 9730va  |
|      |      |         | 13860va                     |         |         |         |
| 2030 | 2100 |         | Cuba, Radio Havana          |         | 9505va  |         |
| 2030 | 2100 |         | Sweden, Radio               | 6065va  | 7420va  |         |
| 2030 | 2100 |         | USA, Voice of America       |         | 4930af  | 6080af  |
|      |      |         | 7595as                      | 11975af | 13710af | 15580af |
| 2030 | 2100 | Sat/Sun | USA, Voice of America       |         | 4940af  |         |
| 2045 | 2100 |         | India, All India Radio      |         | 7410eu  | 9445eu  |
|      |      |         | 9910oc                      | 9950eu  | 11620eu | 11715oc |
| 2045 | 2100 | DRM     | Vatican City, Vatican Radio |         | 9800am  |         |
| 2050 | 2100 |         | Vatican City, Vatican Radio |         | 4005eu  | 5885eu  |
|      |      |         | 7250eu                      |         |         |         |

## 2100 UTC - 4PM EST / 3PM CST / 1PM PST

|      |      |          |                                   |          |         |          |
|------|------|----------|-----------------------------------|----------|---------|----------|
| 2100 | 2120 |          | Vatican City, Vatican Radio       | 4005eu   | 5885eu  |          |
|      |      |          | 7250eu                            |          |         |          |
| 2100 | 2127 |          | Czech Rep, Radio Prague           | 5930va   | 9430va  |          |
| 2100 | 2130 | mtwhfa   | Albania, Radio Tirana             | 7530eu   |         |          |
| 2100 | 2130 |          | Australia, ABC NT Katherine       | 2485do   |         |          |
| 2100 | 2130 |          | Australia, ABC NT Tennant Creek   |          | 2325do  |          |
| 2100 | 2130 |          | Austria, AWR Europe               | 9830af   |         |          |
| 2100 | 2130 | a        | Canada, CBC NQ SW Service         | 9625na   |         |          |
| 2100 | 2130 |          | China, China Radio Intl           | 11640af  | 13630af |          |
| 2100 | 2130 |          | Cuba, Radio Havana                | 9505va   |         |          |
| 2100 | 2130 |          | Italy, IRRS                       | 5775eu   |         |          |
| 2100 | 2130 |          | USA, Voice of America             | 7595as   |         |          |
| 2100 | 2130 | DRM      | Vatican City, Vatican Radio       | 9800na   |         |          |
| 2100 | 2145 |          | Nigeria, Radio/Ibadan             | 6050do   |         |          |
| 2100 | 2159 |          | Canada, Radio Canada Intl         | 5850eu   | 9770eu  |          |
| 2100 | 2159 | smtwhf   | Germany, Overcomer Ministries     |          | 7310eu  |          |
| 2100 | 2159 | Sat/Sun  | Spain, Radio Exterior Espana      | 6125eu   | 11625af |          |
| 2100 | 2200 |          | Anguilla, University Network      | 11775am  |         |          |
| 2100 | 2200 |          | Australia, ABC NT Alice Springs   |          | 2310do  |          |
|      |      |          | 4835do                            |          |         |          |
| 2100 | 2200 |          | Australia, Radio                  | 9500as   | 9660as  | 11650pa  |
|      |      |          | 11695pa                           | 12080as  | 13630as | 15515as  |
| 2100 | 2200 |          | Belarus, Radio                    | 7360eu   | 7390eu  | 7420eu   |
| 2100 | 2200 |          | Canada, CFRX Toronto ON           | 6070na   |         |          |
| 2100 | 2200 |          | Canada, CFVP Calgary AB           | 6030na   |         |          |
| 2100 | 2200 |          | Canada, CKZN St John's NF         | 6160na   |         |          |
| 2100 | 2200 |          | Canada, CKZU Vancouver BC         | 6160na   |         |          |
| 2100 | 2200 |          | China, China Radio Intl           | 9600eu   | 7190eu  |          |
|      |      |          | 9600eu                            |          |         |          |
| 2100 | 2200 |          | Costa Rica, University Network    | 13750va  |         |          |
| 2100 | 2200 |          | Eat Guinea, Radio Africa          | 15190af  |         |          |
| 2100 | 2200 |          | Germany, Deutsche Welle           | 7280af   | 9615af  |          |
|      |      |          | 11690af                           |          |         |          |
| 2100 | 2200 | vl       | Ghana, Ghana BC Corp              | 3366do   | 4915do  |          |
| 2100 | 2200 |          | Guyana, Voice of                  | 3291do   | 5950do  |          |
| 2100 | 2200 |          | India, All India Radio            | 7410eu   | 9445eu  |          |
|      |      |          | 9910oc                            | 9950eu   | 11620eu | 11715oc  |
| 2100 | 2200 |          | Japan, Radio Japan/NHK World      |          | 6035va  |          |
|      |      |          | 6090eu                            | 6180eu   | 11855ca | 17825na  |
|      |      |          | 21670pa                           |          |         |          |
| 2100 | 2200 |          | Liberia, ELWA                     | 4760do   |         |          |
| 2100 | 2200 |          | Liberia, Star Radio               | 11960af  |         |          |
| 2100 | 2200 |          | Malaysia, RTM/Trax FM             | 7295as   |         |          |
| 2100 | 2200 | vl       | Namibia, Namibian BC Corp         | 3270do   | 3290do  |          |
|      |      |          | 6060do                            | 6175do   |         |          |
| 2100 | 2200 | DRM      | New Zealand, Radio NZ Intl        | 15720pa  |         |          |
| 2100 | 2200 |          | New Zealand, Radio NZ Intl        | 17675pa  |         |          |
| 2100 | 2200 |          | Nigeria, Radio/Kaduna             | 4770do   | 6090do  |          |
| 2100 | 2200 |          | Nigeria, Radio/Lagos              | 3326do   | 4990do  |          |
| 2100 | 2200 |          | North Korea, Voice of Korea       | 7570eu   | 12015eu |          |
| 2100 | 2200 |          | Papua New Guinea, Catholic Radio  |          | 4960do  |          |
| 2100 | 2200 |          | Papua New Guinea, NBC             | 4890do   |         |          |
| 2100 | 2200 | vl       | Papua New Guinea, Wantok R. Light |          | 7120va  |          |
| 2100 | 2200 | vl       | Rwanda, Radio                     | 6055do   |         |          |
| 2100 | 2200 | irreg/vl | Sierra Leone, SLBS 3316do         |          |         |          |
| 2100 | 2200 | vl       | South Africa, Channel Africa      | 3345af   |         |          |
| 2100 | 2200 |          | Syria, Radio Damascus             | 9330eu   | 12085eu |          |
| 2100 | 2200 | DRM      | UK, BBC World Service             | 1296eu   |         |          |
| 2100 | 2200 |          | UK, BBC World Service             | 3255af   | 3915as  |          |
|      |      |          | 5875eu                            | 5965as   | 6005af  | 6125as   |
|      |      |          | 6190af                            | 6195va   | 9480eu  | 9650eu   |
|      |      |          | 11675am                           | 15400af  |         |          |
| 2100 | 2200 |          | USA, American Forces Radio        | 4319usb  | 5446usb |          |
|      |      |          | 5765usb                           | 6350usb  | 7811usb | 10320usb |
|      |      |          | 12133usb                          | 13362usb |         |          |
| 2100 | 2200 |          | USA, KAIJ Dallas TX               | 9480na   |         |          |
| 2100 | 2200 |          | USA, KTBN Salt Lake City UT       | 15590na  |         |          |
| 2100 | 2200 |          | USA, Voice of America             | 6080af   | 15580af |          |
| 2100 | 2200 |          | USA, WBCQ Kennebunk ME            | 7415na   | 9330na  |          |
|      |      |          | 18910na                           |          |         |          |
| 2100 | 2200 |          | USA, WBOH Newport NC              | 5920am   |         |          |
| 2100 | 2200 |          | USA, WEWN Birmingham AL           | 6890va   | 15785va |          |
| 2100 | 2200 |          | USA, WHRI Cypress Creek SC        | 9660am   | 11765am |          |
| 2100 | 2200 |          | USA, WINB Red Lion PA             | 13570am  |         |          |
| 2100 | 2200 |          | USA, WRMI Miami FL                | 9955am   |         |          |
| 2100 | 2200 |          | USA, WTJC Newport NC              | 9370na   |         |          |

|      |      |                                  |         |         |
|------|------|----------------------------------|---------|---------|
| 2100 | 2200 | USA, WWCR Nashville TN           | 9975na  | 12160na |
|      |      | 13845na                          | 15825na |         |
| 2100 | 2200 | USA, WWRB Manchester TN          | 9385na  |         |
| 2100 | 2200 | USA, WYFR/Family R Okeechobee FL | 5745va  |         |
|      |      | 5810va                           | 5955af  | 7300va  |
|      |      | 7580va                           | 15195af | 15565af |
| 2100 | 2200 | Zambia, Christian Voice          | 4965af  |         |
| 2100 | 2200 | vi Zimbabwe, ZBC Corp            | 5975do  |         |
| 2115 | 2200 | Egypt, Radio Cairo 9990af        |         |         |
| 2115 | 2200 | USA, WYFR/Family R Okeechobee FL | 11875af |         |
| 2130 | 2156 | Romania, Radio Romania Intl      | 6055va  | 6115va  |
|      |      | 7145va                           | 9755va  |         |
| 2130 | 2200 | Australia, ABC NT Katherine      | 5025do  |         |
| 2130 | 2200 | Australia, ABC NT Tennant Creek  |         | 4910do  |
| 2130 | 2200 | mtwhfa Canada, CBC NQ SW Service | 9625na  |         |
| 2130 | 2200 | Guam, AWR/KSDA 9720as            |         |         |
| 2130 | 2200 | DRM Netherlands, Radio           | 9800na  |         |
| 2130 | 2200 | Turkey, Voice of                 | 9525as  |         |
| 2130 | 2200 | USA, Voice of America            | 7405as  |         |

## 2200 UTC - 5PM EST / 4PM CST / 2PM PST

|      |      |                                      |          |          |
|------|------|--------------------------------------|----------|----------|
| 2200 | 2210 | Syria, Radio Damascus                | 9330eu   | 12085eu  |
| 2200 | 2228 | Hungary, Radio Budapest              | 6025eu   | 9535af   |
| 2200 | 2230 | India, All India Radio               | 7410eu   | 9445eu   |
|      |      | 11715oc                              | 9950eu   | 11620eu  |
|      |      |                                      |          | 11715oc  |
| 2200 | 2230 | Papua New Guinea, NBC                | 4890do   |          |
| 2200 | 2230 | South Korea, KBS World Radio         |          | 3955eu   |
| 2200 | 2230 | Turkey, Voice of                     | 9525as   |          |
| 2200 | 2245 | Egypt, Radio Cairo 9990eu            |          |          |
| 2200 | 2257 | DRM Netherlands, Radio               | 15425na  |          |
| 2200 | 2258 | DRM New Zealand, Radio NZ Intl       | 15720pa  |          |
| 2200 | 2259 | New Zealand, Radio NZ Intl           | 17675pa  |          |
| 2200 | 2300 | Anguilla, University Network         | 6090am   |          |
| 2200 | 2300 | Australia, ABC NT Alice Springs      |          | 2310do   |
|      |      | 4835do                               |          |          |
| 2200 | 2300 | Australia, ABC NT Katherine          | 5025do   |          |
| 2200 | 2300 | Australia, ABC NT Tennant Creek      |          | 4910do   |
| 2200 | 2300 | Australia, Radio                     | 13620as  | 13630pa  |
|      |      | 15240pa                              | 15515va  | 17785va  |
| 2200 | 2300 | Belarus, Radio                       | 7360eu   | 7390eu   |
| 2200 | 2300 | Bulgaria, Radio                      | 7400eu   | 9400eu   |
| 2200 | 2300 | smtwhf Canada, CBC NQ SW Service     | 9625na   |          |
| 2200 | 2300 | Canada, CFRX Toronto ON              | 6070na   |          |
| 2200 | 2300 | Canada, CFVP Calgary AB              | 6030na   |          |
| 2200 | 2300 | Canada, CKZN St John's NF            | 6160na   |          |
| 2200 | 2300 | Canada, CKZU Vancouver BC            | 6160na   |          |
| 2200 | 2300 | DRM Canada, Radio Canada Intl        | 9800na   |          |
| 2200 | 2300 | China, China Radio Intl              | 5915as   | 7170eu   |
| 2200 | 2300 | Costa Rica, University Network       | 13750va  |          |
| 2200 | 2300 | Eqt Guinea, Radio Africa             | 15190af  |          |
| 2200 | 2300 | vi Ghana, Ghana BC Corp              | 3366do   | 4915do   |
| 2200 | 2300 | Guyana, Voice of                     | 3291do   |          |
| 2200 | 2300 | Malaysia, RTM/Trax FM                | 7295as   |          |
| 2200 | 2300 | vi Namibia, Namibian BC Corp         | 3270do   | 3290do   |
|      |      | 6060do                               | 6175do   |          |
| 2200 | 2300 | Nigeria, Radio/Kaduna                | 4770do   | 6090do   |
| 2200 | 2300 | Nigeria, Radio/Lagos                 | 3326do   | 4990do   |
| 2200 | 2300 | Papua New Guinea, Catholic Radio     | 4960do   |          |
| 2200 | 2300 | vi Papua New Guinea, Wantok R. Light | 7120va   |          |
| 2200 | 2300 | irreg/ vi Sierra Leone, SLBS 3316do  |          |          |
| 2200 | 2300 | vi Solomon Islands, SIBC             | 5020do   | 9545do   |
| 2200 | 2300 | Taiwan, Radio Taiwan Intl            | 15600eu  |          |
| 2200 | 2300 | UK, BBC World Service                | 1296eu   |          |
| 2200 | 2300 | DRM UK, BBC World Service            | 5955as   | 5965as   |
|      |      | 5975am                               | 6195as   | 7105as   |
|      |      | 9650eu                               | 9740af   | 15400af  |
| 2200 | 2300 | Ukraine, Radio Ukraine Intl          | 5830eu   |          |
| 2200 | 2300 | USA, American Forces Radio           | 4319usb  | 5446usb  |
|      |      | 5765usb                              | 6350usb  | 7811usb  |
|      |      | 12133usb                             | 13362usb | 10320usb |
| 2200 | 2300 | USA, KAIJ Dallas TX                  | 9480na   |          |
| 2200 | 2300 | USA, KTBN Salt Lake City UT          | 15590na  |          |
| 2200 | 2300 | USA, Voice of America                | 7120va   | 7405as   |
|      |      | 11725va                              | 15185va  | 15290va  |
| 2200 | 2300 | mtwhf USA, WBCQ Kennebunk ME         | 5110na   | 18910na  |
| 2200 | 2300 | USA, WBCQ Kennebunk ME               | 7415na   | 9330na   |
| 2200 | 2300 | USA, WBOH Newport NC                 | 5920am   |          |
| 2200 | 2300 | USA, WEWN Birmingham AL              | 7560va   | 9975va   |
| 2200 | 2300 | USA, WHRI Cypress Creek SC           | 7490am   | 9660am   |
| 2200 | 2300 | USA, WINB Red Lion PA                | 13570am  |          |
| 2200 | 2300 | USA, WRMI Miami FL                   | 7385na   |          |
| 2200 | 2300 | USA, WTJC Newport NC                 | 9370na   |          |
| 2200 | 2300 | USA, WWCR Nashville TN               | 7465na   | 9985na   |
|      |      | 12160na                              | 13845na  |          |
| 2200 | 2300 | USA, WWRB Manchester TN              | 6890na   |          |
| 2200 | 2300 | USA, WYFR/Family R Okeechobee FL     |          | 21525af  |
| 2200 | 2300 | Zambia, Christian Voice              | 4965af   |          |
| 2205 | 2230 | Italy, RAI Intl                      | 6090as   |          |
| 2230 | 2257 | Czech Rep, Radio Prague              | 5930na   | 9435af   |
| 2230 | 2300 | Guam, AWR/KSDA 15320as               |          |          |
| 2230 | 2300 | Papua New Guinea, NBC                | 9675do   |          |

|      |      |                                |         |         |
|------|------|--------------------------------|---------|---------|
| 2230 | 2300 | Sweden, Radio                  | 6065eu  |         |
| 2230 | 2300 | USA, Voice of America          | 7230va  | 9780va  |
|      |      | 13755va                        |         |         |
| 2245 | 2300 | India, All India Radio         | 9705as  | 9950as  |
|      |      | 11620as                        | 11645as | 13605as |
| 2259 | 2300 | New Zealand, Radio NZ Intl     | 17675pa |         |
| 2259 | 2300 | DRM New Zealand, Radio NZ Intl | 17675pa |         |

## 2300 UTC - 6PM EST / 5PM CST / 3PM PST

|      |      |                                      |          |          |
|------|------|--------------------------------------|----------|----------|
| 2300 | 0000 | Anguilla, University Network         | 6090am   |          |
| 2300 | 0000 | Australia, ABC NT Alice Springs      |          | 2310do   |
|      |      | 4835do                               |          |          |
| 2300 | 0000 | Australia, ABC NT Katherine          | 5025do   |          |
| 2300 | 0000 | Australia, ABC NT Tennant Creek      |          | 4910do   |
| 2300 | 0000 | Belarus, Radio                       | 7360eu   | 7390eu   |
| 2300 | 0000 | smtwhf Canada, CBC NQ SW Service     | 9625na   |          |
| 2300 | 0000 | Canada, CFRX Toronto ON              | 6070na   |          |
| 2300 | 0000 | Canada, CFVP Calgary AB              | 6030na   |          |
| 2300 | 0000 | Canada, CKZN St John's NF            | 6160na   |          |
| 2300 | 0000 | Canada, CKZU Vancouver BC            | 6160na   |          |
| 2300 | 0000 | China, China Radio Intl              | 5915as   | 5990am   |
|      |      | 6040na                               | 6145as   | 7180as   |
| 2300 | 0000 | Costa Rica, University Network       | 13750va  |          |
| 2300 | 0000 | Cuba, Radio Havana                   | 9550va   |          |
| 2300 | 0000 | Egypt, Radio Cairo 11885eu           |          |          |
| 2300 | 0000 | Guyana, Voice of                     | 3291do   |          |
| 2300 | 0000 | India, All India Radio               | 9705as   | 9950as   |
|      |      | 11620as                              | 11645as  | 13605as  |
| 2300 | 0000 | Malaysia, RTM/Trax FM                | 7295as   |          |
| 2300 | 0000 | vi Namibia, Namibian BC Corp         | 3270do   | 3290do   |
|      |      | 6060do                               | 6175do   |          |
| 2300 | 0000 | New Zealand, Radio NZ Intl           | 15720pa  |          |
| 2300 | 0000 | DRM New Zealand, Radio NZ Intl       | 17675pa  |          |
| 2300 | 0000 | Papua New Guinea, Catholic Radio     |          | 4960do   |
| 2300 | 0000 | Papua New Guinea, NBC                | 9675do   |          |
| 2300 | 0000 | vi Papua New Guinea, Wantok R. Light |          | 7120va   |
| 2300 | 0000 | Sierra Leone, SLBS 3316do            |          |          |
| 2300 | 0000 | Singapore, MediaCorp Radio           | 6150do   |          |
| 2300 | 0000 | vi Solomon Islands, SIBC             | 5020do   | 9545do   |
| 2300 | 0000 | Turkey, Voice of                     | 5960na   |          |
| 2300 | 0000 | UK, BBC World Service                | 3915as   | 5965as   |
|      |      | 5985as                               | 6170as   | 9480eu   |
|      |      | 11955as                              |          |          |
| 2300 | 0000 | USA, American Forces Radio           | 4319usb  | 5446usb  |
|      |      | 5765usb                              | 6350usb  | 7811usb  |
|      |      | 12133usb                             | 13362usb | 10320usb |
| 2300 | 0000 | USA, KAIJ Dallas TX                  | 9480na   |          |
| 2300 | 0000 | USA, KTBN Salt Lake City UT          | 15590na  |          |
| 2300 | 0000 | USA, Voice of America                | 7120va   | 7405va   |
|      |      | 11725va                              | 15185va  | 15290va  |
| 2300 | 0000 | USA, WBCQ Kennebunk ME               | 5110na   | 7415na   |
|      |      | 9330na                               | 18910na  |          |
| 2300 | 0000 | USA, WBOH Newport NC                 | 5920am   |          |
| 2300 | 0000 | USA, WEWN Birmingham AL              | 7560va   | 9975va   |
| 2300 | 0000 | USA, WHRA Greenbush ME               | 5850na   |          |
| 2300 | 0000 | USA, WHRI Cypress Creek SC           | 7315am   | 7490am   |
| 2300 | 0000 | USA, WINB Red Lion PA                | 9265am   |          |
| 2300 | 0000 | mtwhf USA, WRMI Miami FL             | 7385na   |          |
| 2300 | 0000 | USA, WRMI Miami FL                   | 9955am   |          |
| 2300 | 0000 | Sat/Sun USA, WTJC Newport NC         | 9370na   |          |
| 2300 | 0000 | USA, WWCR Nashville TN               | 5070na   | 7465na   |
|      |      | 9985na                               | 13845na  |          |
| 2300 | 0000 | USA, WWRB Manchester TN              | 6890na   |          |
| 2300 | 0000 | Zambia, Christian Voice              | 4965af   |          |
| 2300 | 2315 | Nigeria, Radio/Kaduna                | 4770do   | 6090do   |
| 2300 | 2315 | Nigeria, Radio/Lagos                 | 3326do   |          |
| 2300 | 2315 | USA, WYFR/Family R Okeechobee FL     |          | 11875af  |
|      |      | 15170am                              | 15400am  | 17555na  |
|      |      |                                      |          | 17575am  |
| 2300 | 2330 | Australia, Radio                     | 9660as   | 12080as  |
|      |      | 13670pa                              | 15230pa  | 15240va  |
|      |      | 17795va                              |          | 17785va  |
| 2300 | 2330 | DRM Germany, Deutsche Welle          | 9800na   |          |
| 2300 | 2330 | USA, Voice of America                | 6180va   | 7205va   |
|      |      | 15150va                              |          |          |
| 2300 | 2356 | Romania, Radio Romania Intl          | 6055va   | 6155va   |
|      |      | 7105va                               | 9610va   | 9755va   |
| 2315 | 2330 | Croatia, Croatian Radio              | 7285sa   |          |
| 2330 | 0000 | Australia, Radio                     | 9660as   | 13620pa  |
|      |      | 13670pa                              | 15230pa  | 15415va  |
|      |      | 17785va                              | 17795va  | 17750va  |
| 2330 | 0000 | Burma, Dem Voice of Burma            | 5955eu   |          |
| 2330 | 0000 | Lithuania, Radio Vilnius             | 7325na   |          |
| 2330 | 0000 | USA, Voice of America                | 6180va   | 7205va   |
|      |      | 11665va                              | 13640va  | 15150va  |
| 2330 | 2357 | Czech Rep, Radio Prague              | 5930na   | 7345na   |
| 2330 | 2358 | Vietnam, Voice of                    | 9840as   | 12020as  |
| 2330 | 2359 | DRM Sweden, Radio                    | 9800na   |          |
| 2335 | 0000 | Sun/Mon Austria, Radio Austria Intl  | 9870sa   |          |
| 2343 | 2368 | twhfa Austria, Radio Austria Intl    | 9870sa   |          |



## LEASAT – The Fleet Augmentation

**F**ollowing hot on the heels of the Navy FLTSATCOM satellites, the next generation of military satellite was unique in many respects. What made them most unique was how the satellites were procured.

This new military satellite series was developed as a commercial venture to provide dedicated communications services to the U.S. military. The program was initiated as a result of Congressional reviews in 1976 and 1977 which advised increased use of leased commercial facilities.

In September 1978, the United States Navy announced a contract award to Hughes Communication Services, Inc., a Hughes Aircraft Company subsidiary, to provide worldwide communications satellite service to the Department of Defense for at least five years at each of four orbital locations. The Navy would act as executive agent on behalf of the Department of Defense.

Hughes was paid \$84 million per year for each operational satellite. At the end of each satellite's designed seven year life, the Navy had the option of purchasing the satellite for \$15 million.

The new satellite, known as LEASAT, began service in 1984. LEASAT was developed to augment the Navy's Fleet Satellite (FLTSAT) Communications System. The LEASAT program was a pioneering effort to provide dedicated communications services through a long-term lease arranged by the Navy for the Department of Defense. The lease provided that the U.S. military would pay for the use of communications channels aboard each spacecraft, but not until the system was built and placed in service.

Users of the LEASAT satellites included mobile air, surface, subsurface, and fixed earth stations of the Navy, Marine Corps, Air Force, and Army. Hughes Space and Communications Group, later known as Hughes Space and Communications Company, built the satellites. Today the company is known as Boeing Satellite Systems, Inc.

The agreement called for Hughes to design, build, launch, and operate a complete communications satellite system. Included were five satellites, one of which was a spare, as well as the associated ground facilities – an operational control center, a network of four fixed ground stations, and two movable stations. The satellites occupied geosynchronous positions over the United States, and over the Atlantic, Pacific, and Indian oceans.

### ❖ LEASAT Launch History

LEASAT F1 was scheduled for launch in June 1984, but the shuttle mission was aborted only seconds before liftoff. Consequently, LEASAT F2 actually became the first in the series, launched on August 30, 1984. LEASAT F1 followed with a November 8, 1984, launch.

LEASAT F3 was launched from the shuttle on April 12, 1985, but it did not achieve orbit when the satellite failed to start. Four months later, NASA and Hughes mounted a salvage attempt during the August 27, 1985, shuttle mission on which LEASAT F4 was launched. After attaching special electronics assemblies to LEASAT 3 during two days of space walks, astronauts manually launched the satellite again. The electronics allowed ground controllers to turn on the satellite and, at the end of October, they fired its perigee rocket to send LEASAT 3 into orbit.

LEASAT 4 successfully obtained orbit and was undergoing tests about a week after launch when its UHF downlink failed. The satellite was declared a loss. The fifth and last LEASAT, which was built as a spare, was successfully launched in January 1990.

### ❖ LEASAT/HS-381 Satellites

These satellites were based on the Hughes HS-381 satellite bus. Each LEASAT satellite was 14 feet (4.26 meters) in diameter and 20 feet, 3 inches (6.17 meters) high with its UHF and omnidirectional antennas deployed. With

its antennas stowed in the launch configuration, LEASAT was 14 feet, 1 inch (4.29 meters) high. Total payload weight (including launch cradle) in the shuttle was 17,000 pounds (7711 kg). Weight after separation from the shuttle was 15,200 pounds (6895 kg), and the satellite's weight on station at the beginning of life was 3,060 pounds (1388 kg).

These satellites were spin-stabilized (30 rpm), with the spun portion containing the solar array and sun and Earth sensors for attitude determination and Earth pointing reference, batteries for eclipse operation, and all propulsion and attitude control hardware. The despun platform contains Earth-pointing reference, batteries for eclipse operation, and all propulsion and attitude control hardware. The despun platform also contains Earth-pointing communication antennas, communication repeaters, and the majority of the telemetry, tracking, and command (TT&C) equipment.

A solid rocket motor was used for the perigee burn, a bi-propellant system for the apogee burn, and a hydrazine system for station-keeping. The design of the LEASAT spacecraft was optimized for Shuttle launch and deployment. The mechanical interface with the shuttle was achieved through a reusable cradle, with five contact points between the spacecraft and the cradle, and five contact points between the cradle and the shuttle.

### ❖ LEASAT Power Sources

Body mounted solar cells provided 1500 watts of power at the beginning of each satellite's life. Solar panel output was 1,238 watts after seven years in orbit. Three 25 A-hr nickel-cadmium batteries for eclipse operation were designed for a nominal maximum 45 percent discharge. Redundancy resulting from the three-battery system permitted full load support with loss of one of the batteries.

### ❖ LEASAT Communications Payload

There were five antennas on the despun platform that provided full Earth coverage. Two large helical UHF antennas (30 cm diameter, 3.8 m long) provided receive and transmit capability in the UHF band (240 to 400 MHz). One omni TT&C, and the Fleet Broadcast uplink and beacon (X-band horns) were in the "exclusive" portions of the SHF band (7250 to 7500 MHz, and 7975 to 8025 MHz). Twelve UHF repeaters provided the main communications capability.

**Table 1: LEASAT Launch History**

|                                                                                                                                                                 |                 |                           |         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------|---------|
| LEASAT 1 (Syncom 4-2)                                                                                                                                           | 1984-093C/15236 | Launched August 30, 1984  | Retired |
| Note: Released from STS 41-D August 31, 1984, sent to an orbital slot at 105 deg West                                                                           |                 |                           |         |
| LEASAT 2 (Syncom 4-1)                                                                                                                                           | 1984-113C/15384 | Launched November 8, 1984 | Retired |
| Note: Released from STS 51-A November 10, 1984, sent to an orbital slot at 105 deg West                                                                         |                 |                           |         |
| LEASAT 3 (Syncom 4-3)                                                                                                                                           | 1985-028C/15643 | Launched April 12, 1985   | Retired |
| Note: Released from STS 51-D April 13, 1985; failed to orbit and subsequently repaired by STS 51-I on August 31, 1985, sent to an orbital slot at 178 deg East. |                 |                           |         |
| LEASAT 4 (Syncom 4-4)                                                                                                                                           | 1985-076D/15995 | Launched August 27, 1985  | Retired |
| Note: Released from STS 51-I August 29, 1985, sent to an orbital slot at 178 deg East                                                                           |                 |                           |         |
| LEASAT 5 (Syncom 4-5)                                                                                                                                           | 1990-002B/20410 | Launched January 9, 1990  |         |
| Note: Released from STS 32 January 10, 1990, sent to an orbital slot at 177 deg West. Reportedly now at 100 deg East serving the Australian Defense Forces.     |                 |                           |         |

**Table 2: LEASAT Channel Characteristics\***

| Channel Type    | No. | Bandwidth, kHz     | EIRP*, dBw | G/T**, dB/K |
|-----------------|-----|--------------------|------------|-------------|
| Relay           | 6   | 25                 | 26         | -18         |
| Wideband        | 1   | 500                | 28         | -18         |
| Narrowband      | 5   | 5                  | 16.5       | -18         |
| Fleet Broadcast | 1   | Onboard Processing | 26         | -20         |

\* LEASAT Channel Breakout (note Table 3 is a complete list of all bandplans and frequencies)

Channel 1: X-Band uplink, UHF downlink, 25 kHz bandwidth for fleet broadcast using spread-spectrum anti-jamming protection.

Channel 2: UHF, 500 kHz bandwidth.

Channels 3 to 8: UHF, 25 kHz bandwidth.

Channels 9 to 13: UHF, 5 kHz bandwidth.

\*\*Specified minimum values over the coverage areas for the full service period.

**Table 3: LEASAT Frequency Bandplans**

| Whiskey                             | X-ray       | Yankee      | Zulu        |
|-------------------------------------|-------------|-------------|-------------|
| Channel 1: Fleet Broadcast Channels |             |             |             |
| 250.350/SHF                         | 250.450/SHF | 250.550/SHF | 250.650/SHF |

Channel 2: 500 kHz Wideband Channels\*

|      |                 |                 |                 |                 |
|------|-----------------|-----------------|-----------------|-----------------|
| Down | 263.550-264.050 | 260.350-260.850 | 261.450-261.950 | 262.050-262.550 |
| Up   | 297.150-297.650 | 293.950-294.450 | 295.050-295.550 | 295.650-296.150 |

Channels 3-8: 25-kHz Navy Relay Channels

|                     |                 |                 |                 |
|---------------------|-----------------|-----------------|-----------------|
| Ch 3251.850/292.850 | 251.950/292.950 | 252.050/293.050 | 252.150/293.150 |
| Ch 4253.550/294.550 | 253.650/294.650 | 253.750/294.750 | 253.850/294.850 |
| Ch 5255.250/296.250 | 255.350/296.350 | 255.450/296.450 | 255.550/296.550 |
| Ch 6256.850/297.850 | 256.950/297.950 | 257.050/298.050 | 257.150/298.150 |
| Ch 7258.350/299.350 | 258.450/299.450 | 258.550/299.550 | 258.650/299.650 |
| Ch 8265.250/306.250 | 265.350/306.350 | 265.450/306.550 | 265.550/306.550 |

Channels 9-13: AFSATCOM Narrowband Channels

|                     |                 |                 |                 |
|---------------------|-----------------|-----------------|-----------------|
| Ch 9243.855/316.955 | 243.955/317.055 | 244.055/317.155 | 244.155/317.255 |
| Ch 10               | 243.860/316.960 | 243.960/317.060 | 244.060/317.160 |
| Ch 11               | 243.875/316.975 | 243.975/317.075 | 244.075/317.175 |
| Ch 12               | 243.900/317.000 | 244.000/317.100 | 244.100/317.200 |
| Ch 13               | 243.910/317.010 | 244.010/317.110 | 244.110/317.210 |

\*Here is a channel breakout of the wideband channels

|       |                 |                 |                 |                 |
|-------|-----------------|-----------------|-----------------|-----------------|
| W2-1  | 263.550/297.150 | 260.350/293.950 | 261.450/295.050 | 262.050/295.650 |
| W2-2  | 263.575/297.175 | 260.375/293.975 | 261.475/295.075 | 262.075/295.675 |
| W2-3  | 263.600/297.200 | 260.400/294.000 | 261.500/295.100 | 262.100/295.700 |
| W2-4  | 263.625/297.225 | 260.425/294.025 | 261.525/295.125 | 262.125/295.725 |
| W2-5  | 263.650/297.250 | 260.450/294.050 | 261.550/295.150 | 262.150/295.750 |
| W2-6  | 263.675/297.275 | 260.475/294.075 | 261.575/295.175 | 262.175/295.775 |
| W2-7  | 263.700/297.300 | 260.500/294.100 | 261.600/295.200 | 262.200/295.800 |
| W2-8  | 263.725/297.325 | 260.525/294.125 | 261.625/295.225 | 262.225/295.825 |
| W2-9  | 263.750/297.350 | 260.550/294.150 | 261.650/295.250 | 262.250/295.850 |
| W2-10 | 263.775/297.375 | 260.575/294.175 | 261.675/295.275 | 262.275/295.875 |
| W2-11 | 263.800/297.400 | 260.600/294.200 | 261.700/295.300 | 262.300/295.900 |
| W2-12 | 263.825/297.425 | 260.625/294.225 | 261.725/295.325 | 262.325/295.925 |
| W2-13 | 263.850/297.450 | 260.650/294.250 | 261.750/295.350 | 262.350/295.950 |
| W2-14 | 263.875/297.475 | 260.675/294.275 | 261.775/295.375 | 262.375/295.975 |
| W2-15 | 263.900/297.500 | 260.700/294.300 | 261.800/295.400 | 262.400/296.000 |
| W2-16 | 263.925/297.525 | 260.725/294.325 | 261.825/295.425 | 262.425/296.025 |
| W2-17 | 263.950/297.550 | 260.750/294.350 | 261.850/295.450 | 262.450/296.050 |
| W2-18 | 263.975/297.575 | 260.775/294.375 | 261.875/295.475 | 262.475/296.075 |
| W2-19 | 264.000/297.600 | 260.800/294.400 | 261.900/295.500 | 262.500/296.100 |
| W2-20 | 264.025/297.625 | 260.825/294.425 | 261.925/295.525 | 262.525/296.125 |
| W2-21 | 264.050/297.650 | 260.850/294.450 | 261.950/295.550 | 262.550/296.150 |

The principal Navy Fleet Broadcast function included an SHF uplink, and both SHF and UHF downlinks. The additional antennas for this channel were the SHF uplink and downlink earth coverage horns, which support the uplink and acquisition/timing function, respectively. The UHF downlink for Fleet broadcast was multiplexed onto the UHF transmit helix.

## ❖ LEASAT Communications System

Since Fleet Satellite Broadcast message traffic is a common denominator for naval communications, it is received by numerous types of ships. In some installations, such as large ships, the fleet broadcast receiver repre-

sents one part of the FLTSATCOM/LEASAT equipment suite. A typical configuration on a large ship would include fleet broadcast, CUDIXS / NAVMACS, secure voice, OTCIXS, TADIXS, teleprinter, and TACINTEL equipment.

## ❖ Demand Assigned Multiple Access (DAMA)

DAMA was developed to multiplex several subsystems or users on one satellite channel. This arrangement allows more satellite circuits to use each UHF satellite channel. LEASAT was the first milsat to take full advantage of DAMA and the result was fewer channels over its FLTSATCOM counterpart.

The number of communications networks

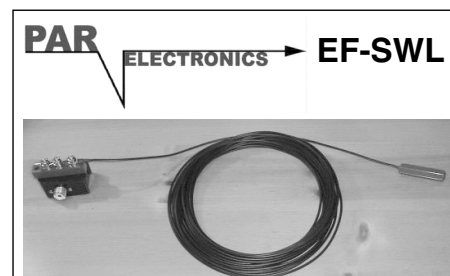
being used is constantly increasing. As a result, all areas of the RF spectrum have become congested. Multiplexing is a method of increasing the number of transmissions taking place in the radio spectrum per unit of time.

Multiplexing involves the simultaneous transmission of a number of intelligible signals using only a single transmitting path. The Navy uses two multiplexing methods: time-division multiplexing (TDM) and frequency-division multiplexing (FDM).

A UHF DAMA subsystem, the TD-1271/U Multiplexer, was developed to provide adequate capacity for the Navy and other DOD users. This subsystem was developed to multiplex (increase) the number of subsystems, or users, on 1 25-kHz satellite channel by a factor of 4.

This factor can be further increased by multiples of 4 by patching two or more TD-1271s together. This method increases the number of satellite circuits per channel on the UHF satellite communications system. Without this system, each satellite communications subsystem would require a separate satellite channel.

The LEASATs, along with the Navy's FLTSATCOM spacecraft, are being replaced by the UFO (UHF Follow-On) spacecraft. We will cover those satellites in a future column, but next month we will postpone our satellite profiles to present our annual *Milcom* airshow column. Until then, 73 and good hunting.



The Par EF-SWL is an end-fed short wave antenna optimally designed for 1-30 MHz reception. The radiator is 45 feet of genuine #14 gauge black polyethylene coated Flex-Weave wire (168 strands of #36 gauge woven copper). This material is very strong yet can easily be coiled like a rope for portable work. The UV resistant matchbox houses a wideband 9:1 transformer wound on a binocular core. Unlike other transformers, external stainless studs on the matchbox allow the user to configure the primary and secondary grounds for best noise reduction at their particular location. Output is via a silver/teflon SO239 connector.

**Par EF-SWL Order #2205 \$57.95**

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Note: Orders under \$100 ship UPS for only \$6.95.

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## New Stations and "Criticality"

**W**hoever said they weren't minting any new AM stations hasn't seen this month's *American Bandscan*! This month we have three new stations to report on the air. **CJRJ** Vancouver is an ethnic station for the city's large South Asian population. **KKAG** Fargo was still testing at press time; rumor has it they're to carry traditional country music or nostalgia. I have no idea what **KENT** is running in Utah – if you hear them, let me know!

Three new stations have been approved by the FCC: one in Rhode Island and the other two in Texas. It could be awhile before any of these are up and on the air.

And they're not done yet. Ten applications for new stations have gone on public notice. All three Canadian applications are for ethnic stations, and the two expanded-band applications in Ontario are mutually exclusive; only one can be granted. If the Hawaii application were to be granted, it would be the only station in the U.S. on a local channel to use more than 1,000 watts. (Local channels are 1230, 1240, 1340, 1400, 1450, and 1490 kHz)

There are more details in the sidebar. A bit of explanation might be in order. For the newly-authorized station in Charlestown, Rhode Island, the technical facilities are listed as "2,500/5,000 DA-2." 2,500 is the authorized daytime power; 5,000 the nighttime power. DA-2 is the antenna configuration; this station will use a directional antenna at all times, with different patterns daytime and nighttime. Possible configurations are:

ND: Non-directional at all times.  
DA-N: Directional only at night, non-directional daytime.  
DA-D: Directional only during the day. (Usually this applies to stations that don't operate at all at night, but there are a very few stations that are directional during the day and non-directional at night.)  
DA-1: Directional at all times, same pattern day and night.  
DA-2: Directional at all times, different patterns day and night.  
DA-3: Directional at all times, three different patterns (see below).

Why DA-3? Long-distance conditions don't just "snap" on at sunset and "snap" off at sunrise. The improvement at night is gradual, and



Two towers of **WBBR-1130**, New York. This station uses four towers to achieve their DA-N (directional only at night) signal.

starts before the sun goes down. In some cases, the potential for interference is so severe that the FCC requires a station begin reducing power before sunset. To this end, "critical hours" are defined as the two hour period following local sunrise, and the two hour period preceding local sunset. Some stations must use an intermediate power during these periods, more power than used at night but less than during full daylight. Often a different antenna pattern is also required: hence, DA-3.

As an example, **KKAG** in Fargo is authorized 50,000 watts during the day, but only 7,500 during critical hours. (And only 940 at night.) This month, Fargo "FCC sunrise" is 7:30am, and "FCC sunset" is 5:45pm. **KKAG** may operate at 50,000 watts with their daytime pattern from 9:30am to 3:45pm; they switch to critical-hours pattern and reduce to 7,500 watts between 3:45 and 5:45pm and between 7:30 and 9:30am; and switch to nighttime pattern and reduce to 940 watts between 5:45pm and 7:30am.

Broadcast DX clubs (National Radio Club, International Radio Club of America) define

their own set of configuration abbreviations, allowing for the staggering number of possible critical hours combinations. What the FCC considers "ND," the clubs call "U1." DA-N = U2; DA-D = D3 if the station only operates during the day, or U5 if it also operates at night. The NRC *AM Radio Log* defines 25 (!) different possible combinations – and the narrative text suggests two more, ranging up through U17! By the way, they consider **KKAG** to be U7.

### ❖ IBOC/HD/Digital Radio News

It's been a quiet month on the IBOC (In Band On Channel) front. Radio Shack has reportedly begun carrying an Accurian HD radio (and possibly the Boston Acoustics model?), but I haven't seen any in my recent visits. Locally, **WVNS-102.5** has dropped their digital signal (probably temporarily), while **WRQQ-97.1** and **WKDF-103.3** have added it. I haven't heard of IBOC being added at any major AM stations lately.

Another form of digital broadcasting is in mid-deployment. In mid-November, TV station **KLDT** in Dallas applied for permission to shut down their analog operation on

### NEW AM STATIONS

|                                                      |      |             |                                |                |  |
|------------------------------------------------------|------|-------------|--------------------------------|----------------|--|
| <b>On the Air:</b>                                   |      |             |                                |                |  |
| Vancouver, B.C.                                      | 1200 | <b>CJRJ</b> | 25,000/25,000                  | DA-1           |  |
| Fargo, N.D.                                          | 740  | <b>KKAG</b> | 50,000/940                     | DA-3 (testing) |  |
| Parowan, Utah                                        | 1400 | <b>KENT</b> | 1,000/1,000                    | ND             |  |
| <b>New AM station permits granted:</b>               |      |             |                                |                |  |
| Charlestown, R.I.                                    | 1370 |             | 2,500/5,000                    | DA-2           |  |
| Comstock, Tex.                                       | 1450 |             | 1,000/1,000                    | ND             |  |
| Presidio, Tex.                                       | 1230 |             | 800/710                        | ND             |  |
| <b>Applications for new AM stations:</b>             |      |             |                                |                |  |
| Arroyo Grande, Cal.                                  | 1060 |             | 10,000/1,200                   | DA-2           |  |
| Mountain Ranch, Cal.                                 | 1340 |             | 1,000/1,000                    | ND             |  |
| Keystone, Colo.                                      | 1320 |             | 1,000/500                      | DA-2           |  |
| Honaunau, Hi.                                        | 1340 |             | 10,000/10,000                  | ND             |  |
| Winnemucca, Nev.                                     | 1340 |             | 250/250                        | ND             |  |
| Brampton, Ont.                                       | 1650 |             | 1,000/680                      | ND             |  |
| Mississauga, Ont.                                    | 1650 |             | 1,000/1,000                    | ND             |  |
| Montreal, Que.                                       | 1400 |             | 1,000/1,000                    | ND             |  |
| Greenville, R.I.                                     | 1140 |             | 27,000/1,200                   | DA-2           |  |
| Langtry, Tex.                                        | 1400 |             | 1,000/1,000                    | ND             |  |
| <b>Stations moved to new frequencies:</b>            |      |             |                                |                |  |
| Sycamore, Ill.                                       | 1180 | <b>WSQR</b> | from 1560, 900/1               | ND             |  |
| Huntsville, Tex.                                     | 1410 | <b>KHCH</b> | from 1400, 250/87              | ND             |  |
| <b>Station granted move to new frequency:</b>        |      |             |                                |                |  |
| Sunnyside, Wash.                                     | 1230 | <b>KZTS</b> | from 1210, 700/700             | ND             |  |
| <b>Stations requesting moves to new frequencies:</b> |      |             |                                |                |  |
| Apollo, Penna.                                       | 1360 | <b>WAVL</b> | from 910, 6,700/700            | DA-2           |  |
| Mount Lebanon, Penna.                                | 910  | <b>WPTT</b> | from 1360 in McKeesport, 7,000 | DA-D           |  |
| <b>Callsigns assigned to new stations:</b>           |      |             |                                |                |  |
| Kearsarge, Penna.                                    | 1590 | <b>WCXJ</b> |                                |                |  |
| Essex Junction, Vt.                                  | 670  | <b>WVVT</b> |                                |                |  |



channel 55 and switch to digital-only operation on channel 54. Similar shutdowns have already happened in Orlando, on Long Island, and in Seattle.

Qualcomm, a San Diego company, filed comments supporting KLDL's application. It seems Qualcomm has a nationwide license for use of TV channel 55 after "transition" – when analog TV is shut down in two years. Rumor had it they intended to use the spectrum to broadcast to cellular phones; their comments in the KLDL proceeding are the first details I've seen of what they plan to do. Qualcomm also filed comments in support of the early shutdowns in Florida, New York, and Washington State, but what I read didn't go into nearly as much detail.

Their service is called "MediaFLO." It's a "mediacast" service that will initially provide up to 15 live video programs, numerous "clipcast" channels that will provide video-on-demand; and numerous audio channels. MediaFLO is a pay broadcast service, "...available at 'mass market' prices..." Qualcomm promises local programming, breaking news, weather, public affairs, and emergency alerts in both audio and visual form.

It sounds a lot like over-the-air TV from here!

## ❖ Big Sky DX

A massive joint DX Test was held on the early morning of November 19<sup>th</sup>. Six Montana stations were scheduled to test:

|           |               |              |
|-----------|---------------|--------------|
| KANA-580  | Anaconda      | 1,000 watts  |
| KKGR-680  | East Helena   | 5,000 watts  |
| KERR-750  | Polson        | 50,000 watts |
| KLCY-930  | East Missoula | 5,000 watts  |
| KGVO-1290 | Missoula      | 5,000 watts  |
| KEIN-1310 | Great Falls   | 5,000 watts  |

Five of the six were scheduled to test for two hours between midnight and 2am Mountain Time. (KERR's test was somewhat shorter, running only until a bit before 1am.) Tests were to include sweep tones and Morse IDs.

Montana is a difficult state to log from the East. There are few stations on clear channels, and all of them use highly directional antennas to beam all their power away from co-channel eastern stations at night. I've never heard Montana from here, and only heard the state once (very weakly) when I lived in Wisconsin.

The vast majority of the reports of this test involved KKGR and KERR. KERR was heard in Astoria, Oregon; Denver; and Maryland, among other places. KKGR made it to Chicago, Denver, Champaign IL – and here! I heard three sets of (very fast!) Morse IDs and sweep tones and got them "on tape." (Actually, I recorded them on my computer with WavePad.)

I probably heard KERR as well, with country music way under WSB Atlanta, but I didn't catch any identification announcements. Montana #1! Now, my most wanted states would be Idaho and Oregon...

Some DXers in the west reported hearing KANA and KEIN. Reportedly, KLCY and KGVO didn't test after all.

## ❖ Golden State DX

Many of those staking out 680 kHz for

KKGR noted that KNBR, San Francisco, was a major source of interference to the test. That includes myself and Tom Jasinski near Chicago. KNBR was the strongest signal on 680 during the test and provided clear IDs at several points. Some DXers lament the difficulty in logging California from the East these days – if you still need the Golden State and there isn't a strong 680 station in your backyard, you need to be looking for KNBR.

Speaking of KNBR, if you're DXing from California the station is probably much more of a pest than it is in Tennessee. If you are a member of one of the DX clubs, you would have been aware of a "non-test" run by KNBR and sister station KTCT-1050 on November 28th and 29th. A "non-test" is when a station that's normally a "pest" for DXers has a scheduled silent period for maintenance. DXers near the "pest" station can often use this period to nab distant stations not normally audible under the strong local. A similar "non-test" was run by KBOI-670, Boise, on November 14th.

## ❖ New Brunswick DX

Miscou Island lies at the northeastern tip of New Brunswick on Canada's East Coast. In mid-September, DXers Ken Alexander, Jacques d'Avignon, Kevin Carey, and Niel Wolfish went on a longwave/mediumwave DXpedition to the island. AM BCB antennas consisted of two EWEs, each 3m (10-ft) high and 17m (50-ft) long, one to Europe and the other to Africa. A 20m (65-ft) loop on Europe was also used. Receivers included an AOR AR-7030+ and a Drake R8.

Thirty-four countries were heard on the AM broadcast band, 29 of them in Europe or Africa. (They concentrated on trans-Atlantic DX and didn't try to identify American stations.) 105 different overseas stations were heard, 98 of them identified. Some of the more interesting countries heard included Kuwait-1548; Sao Tome-1530 (VOA); United Arab Emirates-1476; Guinea-1386; and Lesotho-1197. Five more stations in four countries were heard on longwave, including Belarus on 279 kHz. (See *December Below 500 kHz for longwave loggings from this DXpedition - ed.*)

## ❖ More from Asia

Back in October, I mentioned that the Armed Forces Net website suggested a station was operating on 810 kHz from Tokyo. Jon Van Allen, KF7YN identifies this station as "Eagle 810" from Yakota Air Base near Yokohama.

Also in October, Ken Brown N4SO reported hearing an Armed Forces Net station on 650 kHz out of Okinawa. Jon writes that he hasn't heard this station in years, despite passing Okinawa regularly. He assumed that (like many AM stations throughout the world) it had moved to FM, but will check again next time he's in the neighborhood...

Jon is a Radio Electronics Officer aboard the *M/V APL Singapore*, sailing between the U.S. West Coast and various East Asian ports. He DXs from aboard ship and reports hearing KHVH-830, Honolulu, most of the way across.

## ❖ Stations Sold

Clear Channel Communications Inc. has been sold to two investment firms. Thomas H. Lee Partners L.P. and Bain Capital Partners LLC agreed to pay nearly \$19 billion for the largest radio group in the U.S. The Clear Channel the firms are getting will be a significantly smaller company. Independent of the buyout, they've announced they will sell 448 of their 1,150 radio stations (all in smaller markets) and all of their 42 TV stations. No major changes are expected in the short run.

## ❖ 'Til next month

Have you checked out my blog? Visit <http://americanbandscan.blogspot.com> where you'll find last-minute information about FCC and CRTC actions on AM radio, links to DX test information, and other news that broke too late to make this column. Write me at 7540 Highway 64 West, Brasstown NC 28902-0098, or by email to [dougsmith@monitoringtimes.com](mailto:dougsmith@monitoringtimes.com). Good DX!

### URLs in this month's column:

<http://americanbandscan.blogspot.com>  
My AM DX blog  
[www.dxtests.info](http://www.dxtests.info)  
Brandon Jordan's site covering AM DX test broadcasts  
[www.nch.com.au/wavepad/masters.html](http://www.nch.com.au/wavepad/masters.html)  
WavePad audio recording/editing software  
[www.nrcdxas.org](http://www.nrcdxas.org)  
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## Longwave Resources

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## VHF Aircraft Listening Potpourri

**T**his month, the *Planes* column presents a number of interesting VHF aircraft communications topics. These are all questions I've received directly or have seen in on line aviation-related groups. Thanks to Mike, Stuart Smith, George Bellows, and John Porter who helped initiate this discussion of intersections, receivers, coaxial cable, interference, aeronautical charts, "fish finders," and more!

### ❖ Magic in North Carolina

*I live near High Point, NC. On the Atlanta Center frequency of 128.8, I frequently hear commercial airlines telling Atlanta that they "are crossing Magic" or that they "just crossed Magic." What does this mean?*

There are established, but invisible, air routes in the sky. Specific points along these routes with exact latitudes and longitudes are identified by names. The names are five-letters to be compatible with the FAA computers. Both the names and the spellings can be strange.

At [www.fltplan.com/navaidfixes.htm](http://www.fltplan.com/navaidfixes.htm) click on "M" at the bottom of the "Find Air-space Fixes" box. In the list, MAGIC turns out to be in Montana and not in your area. So, assuming that it is an airspace fix/intersection reference that you are hearing, it may be one that isn't a real word but sounds something like MAGIC. In the "M" listing there is MAJEG, a similar sounding name. It is in Alabama and a little closer. MAJIC, however, is in North Carolina. It is likely that this is the one you hear mentioned in pilot-controller communications. See Aero Charts below.

Some frequently heard five-letter fixes can be part of Standard Terminal Arrival Routes (STARs). For this example, go to [www.airnav.com/airports](http://www.airnav.com/airports) and to Charlotte/Douglas International Airport (CLT) and scroll way down to "STARs - Standard Terminal Arrivals" and take a look at the "MAJIC NINE" arrival. It is a 331 kb PDF download which prominently shows MAJIC, <http://204.108.4.16/d-tp/0612/00078majic.pdf>

In the February 2005 issue of *MT*, I explain some of this and more: "Names and Numbers Used in Aircraft Communications." Also consider *MT Anthology* CDs for other interesting and informative articles, see: [www.grove-ent.com/mtantindividual.html](http://www.grove-ent.com/mtantindividual.html)

### ❖ Quest for a Better Receiver

*I find the VHF aircraft band in scanners a bit weak. A few years ago, I began monitoring*



*Ramsey AR2 Aircraft Receiver. If you have one, let us know what you think. Photo courtesy Ramsey Electronics.*



*Microair M760 VHF Airband Transceiver. Do VHF aircraft transceivers receiver better than good scanners? Photo courtesy Microair Avionics.*

*VHF-FM Marine & Public Safety communications with Motorola equipment and have not gone back to scanners. I would like to upgrade my receivers for the aircraft band as well. I have seen the MicroAir M760 and some others listed which seem pretty nice. I don't need to transmit, of course. Also, I wish I could find a review on the Ramsey AR2 aircraft receiver. I'm really interested in receiving a handful of good, active aircraft band frequencies with quality signals and forgo the convenience of scanning. Would you share your thoughts on receivers for this band – other than scanners?*

I am sorry to report that I have no experience with aircraft transceivers. I agree that the AR2 and M760 would be fun to play with: [www.ramseyelectronics.com](http://www.ramseyelectronics.com) and [www.sportflyingshop.com](http://www.sportflyingshop.com) (rest cursor on "Communications" > "Radios," click on Microair).

In terms of scanner weaknesses, some produce "intermod" responses. This is where strong stations can mix in a scanner and pop

up on undesired frequencies. If either station in the mix stops transmitting, the mix goes away. Mixes that include strong pagers in the 152 MHz area are not an uncommon problem, especially in metro areas. Among others, mixes can include two-meter amateur radio (144-148 MHz), FM (88-108 MHz), and NOAA weather transmissions (mid 162 MHz).

More common with older scanners are images, poor selectivity, and sometimes overload. "Images," in simple terms, are where stations pop up on receivers at predictable spacings from the real transmit frequency, in addition to where they should be. "Selectivity" is a measure of how well a receiver rejects adjacent channel transmissions. "Overloading" is where strong signals simply overload the amplifiers and distortion results, as well as reducing receiver sensitivity on other frequencies – "desensing." Also, some scanners have audio that is not distinct and clear, even with the use of good external speakers.

"Sensitivity" is a measure of a receiver's ability to receive weak signals. Yes, some scanners may lack sensitivity but before exploring sensitivity, one needs to be sure he/she is using an antenna designed for the VHF aircraft band or one that includes that band in its multi-band design. Not all do. Antennas need to be mounted as reasonably as high as possible and in the clear. Please see the *MT* November 2006 issue: "Base Station Aircraft Listening Antennas."

It would be fair to say that most listeners would want to be plagued less by the inadequacies of some scanners. Can any of you, the readers, offer recommendations for better quality non-scanner receivers, or scanners for that matter, for the VHF aircraft band that perform well when using a good quality, reasonably high roof or tower-mounted antenna?

### ❖ Better Coax, More Interference

*I replaced my RG-58 coax with RG-6 last evening and gained more signal than I wanted. I am hearing a lot more of the weak signals and gained 1-2 bars on signal strength but also a lot of overload with that, some in the VHF aircraft band.*

That reminds me of a time some years ago when a friend upgraded his scanner antenna and blamed the antenna for the new interference. It really isn't the antenna but the particular receiver's inability to handle the stronger signals. You have simply exposed the next weak link in the chain. Try to not be frustrated by this and

consider it just part of the upgrade path that is an ever-present and looming aspect of the radio hobbies.

Also, if you track it down to an intermod mix involving pager transmissions or possibly FM broadcast, consider a band-reject filter such as those presented here: [www.grove-ent.com/filters.html](http://www.grove-ent.com/filters.html)

## ❖ Fish Finder

*Recently, I have heard things like "The fish finder is showing ..." and "Got him on the Tee-CAS." What is this?*

These are unofficial terms that refer to TCAS – Traffic Alert and Collision Avoidance System. TCAS has a cockpit display that shows nearby transponder-equipped aircraft as an aid to help avoid mid-air collisions. It can sound a proximity warning or give a voice Resolution Advisory (RA) if it calculates a potential collision threat. RAs given to the two aircraft are coordinated and complementary so that both planes don't immediately climb, for example, and still collide.

It is reported that there have been no mid-air airline collisions in the U.S. since 1990 when airliners started to use TCAS. It appears that controllers do not accept a pilot's report of traffic on TCAS displays as visual contact and that controllers are not interested in hearing what pilots see on their TCAS displays. Aside from the alarms, the TCAS displays show nearby aircraft which can assist pilots in establishing actual visual contact out the window.

## ❖ Aero Charts

*Could you very briefly describe how aircraft listeners use aeronautical charts? I'm a novice, obviously!*

To really understand aircraft communications, a person must learn some about what aircraft and pilots are doing in the air. This can range from simple to complex, but, because it is a hobby, you can take this to whatever extent that you like. The fortunate thing is that there is a great deal of information intended for pilots that listeners can access and use as well. Aeronautical charts are just one of those tools.

A number of the things that pilots and controllers mention on the radio can be found on aero charts. If you look up these things on charts as you hear them, you will become familiar with what they are, where they are, and learn more about how they are used by pilots and controllers. This familiarity makes listening much more enjoyable.

The following communications excerpts serve as examples of what you might hear referred to and then be able to find on aero charts.

### Airports

Needless to say, airports are shown on aero charts and references to them are fairly easy to understand. "Southwest Ten Sixty-Seven, Sacramento International Airport off to your right, two o'clock, five miles." "Southwest Twenty-Seven Seventy-Seven, contact Capitol Tower, one two five point seven."

Both aircraft are landing at Sacramento

International. Here is a confusion factor – the airport name and the tower names are not the same. This is the case at some but not all airports. Figuring out things like this is part of the fun and the detective work that aircraft listening holds in store.

### VOR navigational stations

VOR (VHF Omnidirectional Range) stations play an important role in aero navigation and appear on aero charts. "Cross Concord VOR at or above 2000," Here, Concord VOR is clearly called out as a VOR. Concord is a Northern California city but also the name of a VOR – not uncommon, and sometimes confusing. You can confirm what may be VOR names here: [www.airnav.com/nav aids/](http://www.airnav.com/nav aids/).

Note that a plane can be cleared to a VOR that has a city name. That city is not the destination but just a point in the air above the VOR along the way to a destination. The next controller instruction helps with this explanation.

"Alaska Two Thirty-Six, you are cleared Point Reyes, Golden Gate Four Arrival, San Francisco." Point Reyes, here again, is the name of a city and a VOR. San Francisco is the destination. This can be confirmed using FlightAware <http://flightaware.com> – and in this case, by entering "Alas" in the "Enter Airline Name Here" box, and from the list that opens, select "Alaska Airlines, Inc." In the "Flight Number" box enter "236" and click on "Track Commercial Flight."

Golden Gate Four Arrival is on its own chart/"approach plate." Go to San Francisco airport [www.airnav.com/airport/KSFO](http://www.airnav.com/airport/KSFO) and scroll way down and click on the GOLDEN GATE FOUR download. You will see several VORs by name, which play a part in this arrival. This example uses Point Reyes and SFO, but is typical of all metro airport approaches.

Another aspect of VORs are radials, which are like numbered spokes on a bicycle wheel – by degrees, from magnetic North. You will hear controllers call out specific radials at times. For VOR info, see: [www.navfltsm.addr.com/vor-nav.htm](http://www.navfltsm.addr.com/vor-nav.htm)

### Airways

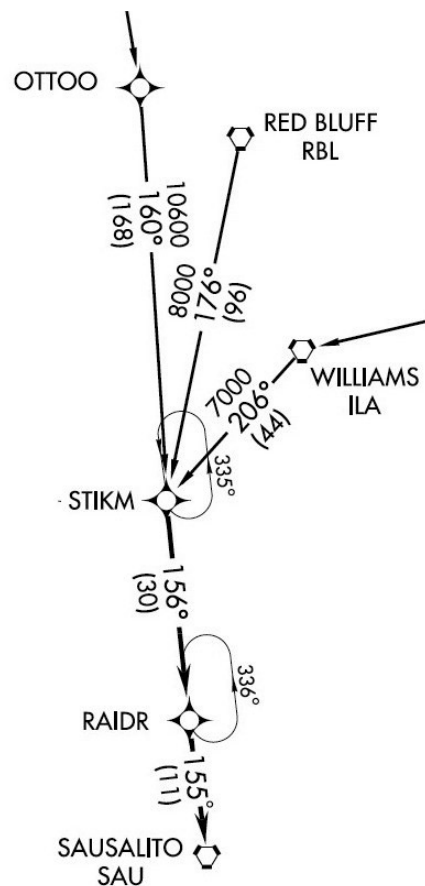
Airways are shown as lines on charts connecting VORs. IFR (Instrument Flight Rules) High and IFR Low Altitude charts are covered with VORs, airways, and intersections. "Verify established on Victor Six," "...then join Victor One Zero Eight."

### Intersections / Fixes

Airways that cross can result in named intersections. An intersection is a type of "airspace fix." Fixes/Intersections are marked with names on IFR charts. "Proceed COUPS intersection and then maintain three thousand." "...cleared direct STIKM intersection and then the remainder of RAIDR TWO ARRIVAL." See STIKM graphic.

### More ...

In addition to the above, visual landmarks and topographic features, airspace classes and boundary information, NAVAIDS in addition



*The STIKM intersection (mentioned in column text) is part of the RAIDR TWO approach for Oakland International (OAK). Also shown are the OTTOO and RAIDR intersections. Note that the RED BLUFF VOR 176 degree radial and the WILLIAMS VOR 206 degree radial point to and intersect the STIKM intersection. The larger context is shown on IFR charts.*

to VORs, Flight Service Station (FSS) info, frequencies, and more are shown on charts and much of which will be called out by controllers.

This site [www.flytandem.com/airspace.htm](http://www.flytandem.com/airspace.htm) offers great airspace info and nice Sectional Chart graphics examples. IFR Charts have an entirely different look.

### Chart Info

For aero chart info, go to <http://avn.faa.gov> and click on "Aeronautical Charting," then on "Catalogs/Ordering Info," then on "IFR Charts," and explore the High and the Low Altitude Enroute charts available for your area. These can be ordered from the government or retailers such as: <http://store.pilotshop-world.com/charts.html> or [www.sportys.com/acb/Category.cfm?&DID=19&CATID=92](http://www.sportys.com/acb/Category.cfm?&DID=19&CATID=92)

Chart User's Guides are both interesting and informative. These are all downloadable for free and not only worth a look, but can be saved to your hard drive for later reference. [http://avn.faa.gov/index.asp?xml=naco/online/aero\\_guide](http://avn.faa.gov/index.asp?xml=naco/online/aero_guide). Also you may find <http://skyvector.com> fun to play with. It displays searchable Sectional Charts.

Have fun listening. Send questions and comments.



## Prime Time

**W**hat is it about the middle of winter? For some reason it always seems to bring heightened interest in longwave DXing. Perhaps it's because there's very little static on the band, or that the long nights promote DX from greater distances, or that there's no yard work to do. Whatever the reason, it is a welcome situation for the longwave monitor, and it certainly beats shoveling snow!

### ❖ Chasing Euro-Broadcasters

The interest in this topic never ceases, no matter what the season. Yes, you can hear these stations in North America, but you shouldn't expect "armchair" copy. On a clear winter night, you can often make out what's being said and recognize songs, but you probably won't consider the signals to be "strong" by any means. The key is to listen at times when there is a complete path of darkness between you and the transmitting station. This means East Coast listeners should try for these signals between dusk and about 1 a.m. local time.

Here are some reliable stations you may want to try for. There are many others, but these are the ones most frequently reported to the column:

| Freq. | Location   | Power Out. |
|-------|------------|------------|
| 153   | Algeria    | 250 kW     |
| 162   | France     | 2000 kW    |
| 171   | Russia     | 6400 kW    |
| 183   | Germany    | 2000 kW    |
| 189   | Iceland    | 300 kW     |
| 198   | England    | 600 kW     |
| 234   | Luxembourg | 2000 kW    |
| 252   | Ireland    | 500 kW     |

### ❖ Beacons

Chasing non-directional beacons (NDBs) is hugely popular during the winter months. Low and medium-powered beacons are sprinkled throughout North America and occupy the band between 190 and 535 kHz. These stations do not have very interesting programming – just a slow, repetitive CW message (their ID). However, it is not the content of the transmission we are interested in, but the *fact* of reception.

Most beacons operate with less than 50 watts of power (25 watts in many cases) from small, unmanned shacks. They use a rather small antenna and are not meant to be heard at distances greater than 100 miles or so. Imagine the thrill of pulling one in at five or ten times this distance.

As with broadcasters, nighttime is the best time to listen for beacon DX. Often you'll hear several stations on a single frequency and will need to sort through them to pick out the IDs. To

do this, it helps to know a thing or two about ID formats.

For instance, Canadian IDs can usually be identified by two primary traits. First, they typically use a 400 Hz modulated tone (as opposed to 1020 Hz commonly used in the U.S.) Also, they will have a long dash after the ID (DAID). U.S. beacons do not have a dash after the ID. Using these traits alone, you should be able to quickly determine a beacon's country of origin.

When hunting beacons, don't neglect the band during the daytime. Although you won't hear stations from as far away during the day, you're likely to hear some beacons that are covered up by DX at night. In fact, some DXers enjoy the challenge of daytime monitoring. An intercept of 400 miles or more during the day would be a prized catch indeed.



*Winter is an excellent time to DX for beacons. This is AS/359 kHz near Amherst, NH. It is typical of many aviation beacons scattered throughout North America. V-shaped antenna to the right is for a separate 75 MHz marker signal.*

### ❖ Lowfers

Moving down the band a bit, let's explore a unique sliver of spectrum from 160 to 190 kHz. Officially, this is the Part 15 band, where the FCC allows a variety of low powered devices such as wireless intercoms and power line carriers to operate without a license of any kind. An industrious group of experimenters have been using this band for ham-like operation since at least the early 1970s.

Limited by regulation to 1 watt and a 50 foot/15 meter antenna, these experimenters operate their stations in an effort to "push the envelope" of low power communication. Take a slow spin through this band and you might be rewarded with a Lowfer (low frequency experimental radio) intercept. For an online list of active stations, check out the listings available at [www.lwca.org](http://www.lwca.org). QRSS (super-slow CW) is a predominant mode these days, and you'll need a piece of free software to decode it. One popular program is Argo, available for download at: [www.weaksignals.com](http://www.weaksignals.com).

A little further down the band at 136 kHz, you may find more experimental activity. In many countries, governments permit amateur access to this frequency with much higher power limits than those imposed on the "Lowfer" band. In fact, even in the United States and Canada, there are a few stations operating here with temporary permits.

Jumping up the band for a moment, there's another group of U.S. experimenters operating near 505 kHz under a special FCC license (callsign WD2XSH). For more information on their activities, visit [www.500kc.com](http://www.500kc.com). You can even submit a reception report at this web site.

### ❖ Going Even Lower

Below 136 kHz, the main signals you'll hear are military RTTY stations sending encrypted data. These powerhouses are at various locations in the U.S. and can frequently be heard around the clock. At 60 kHz, you should be able to hear the pulsating carrier of WWVB in Fort Collins, CO. (Newcomers often confuse this signal with slow Morse Code.)

WWVB is the sister station of WWV operating at 2.5, 5, 10, 15 and 20 MHz. Longwave time stations have the advantage of providing a more stable, ground-hugging signal that is desirable for automated time keeping and laboratory applications. Today, it's even possible to buy an inexpensive (under \$30) table clock that locks onto WWVB and provides extremely accurate time that never needs to be reset. Look for more applications of WWVB in the future, including affordable wrist watches and VCRs with WWVB capability.

At 17.2 kHz, you may be lucky enough to hear the last-working example of an Alexanderson Alternator. This electro-mechanical transmitter (no tubes or transistors) takes to the air from a museum in Grimeton, Sweden. It is fired up for special occasions. You can view the operating schedule and learn more about this historic transmitter at [www.alexander.n.se](http://www.alexander.n.se).

Best wishes for wintertime DX! See you next month.

## Al-Zawraa TV Goes Clandestine via Satellite

**T**he pro-Sunni Al-Zawraa television network was raided and shut down during November by Iraqi government authorities. The station nevertheless has stayed on the air with a satellite feed via NileSat in Egypt. Its hard-hitting pro-Baathist and anti-American programming remains popular in some circles within Iraq, despite its closedown by the Iraqi government. The station is owned by Mishaaan Al-Jabburi, who according to the Al-Ahram news service in Egypt has lost his parliamentary immunity and he could face trial in Iraq on corruption charges if he returns from his current exile in Syria. In another irony, Al-Jabburi initially supported the American invasion of Iraq.

According to National Public Radio in the United States, this television network transmits astonishingly anti-government and anti-American programming, with content that is considered quite blunt by Iraqi standards. It is ironic that it has been shut down at a time when the Iraqi government is being showcased as a democracy. The Iraqi authorities have labeled the broadcasts as pirate television, but it maintains a significant viewership within Iraq via satellite. Kim Andrew Elliott of the Voice of America has profiled this operation on his web blog.

This network maintains an internet web site, which, although it is currently only in Arabic, is nevertheless of interest: [www.alzawraa.tv/](http://www.alzawraa.tv/). They use an address of [Info@alzawraa.tv](mailto:Info@alzawraa.tv) for e-mail correspondence.

### ❖ The Future of Radio Closes

Unfortunately, veteran DXer Harry Helms reports that he has been forced to shut down his excellent blog titled *The Future of Radio*. This is a loss to both the DX hobby and the radio industry generally. At *Monitoring Times* we express our appreciation to Harry for his work on this valuable service. Several *MT* readers inquired about what happened to this wonderful blog.

### ❖ Playboy Covers Pirates

While *MT* normally does not cover magazines outside the radio monitoring hobby, some of our readers noted that the December 2006 issue of *Playboy* magazine printed an article about **Pirate Cat Radio** and their brush with the FCC. Of course our readers note that they only bought the magazine for the articles.

### ❖ Daily News Covers Numbers Stations

Artie Bigley noticed that the *New York Daily News* moved numbers stations into the mainstream press with a recommendation on November 26 that readers could hear spy numbers on 6855 and 8010 "on the hour." Of course, the broadcasts are irregular. The newspaper quoted longtime DXer Chris Smolinski in their article, but they said that the CIA refused comment.

### ❖ Schoech's Pirate List

Martin Schoech of Germany, best known as the editor of the excellent *Clandestine Radio Watch* newsletter, points out that he maintains two pirate station address and web site lists. One of those is free, and it can be accessed on the internet at the [www.schoechi.de/pwdb-ema.html](http://www.schoechi.de/pwdb-ema.html) URL. A second detailed address list requires a subscription for 5 Euros or \$6.00 US. You can check out the details on that one at [www.schoechi.de/pwdb.html](http://www.schoechi.de/pwdb.html) on the web.

### ❖ Tokyo Rose Dies

Iva Toguri D'Aquino, better known as Tokyo Rose for her Japanese-based clandestine broadcasts to United States troops during World War II, died in Chicago, IL, on Sep 26, 2006. She had spent ten years in prison after a treason conviction after the war, but she later lived in Chicago and was issued a pardon by President Gerald Ford on his last day in office.

### ❖ What We Are Hearing

*Monitoring Times* readers heard more than two dozen different North American pirates this month. You can hear them too, if you use some simple techniques. Pirate radio stations never use regularly announced schedules, but shortwave pirate broadcasting increases noticeably on weekends and major holidays. Christmas and New Years are the biggest pirate holidays of the year. You sometimes have to tune your dial up and down through the pirate radio band to find the stations, but more than 95% of all North American shortwave pirate broadcasts are heard on 6925 kHz, plus or minus 30 or 40 kHz.

**Altered States Radio-** Their rock and reggae music is announced as a format designed for listeners who like to get high. (Merlin)

**Ann Hoffer Radio-** This pirate plays music by the singer Ann Hoffer, sometimes with discussions of skinny dipping. (None)

**Captain Morgan-** The Captain normally programs rock music and Twilight Zone television audio. (None, says to send loggings to the the Free

Radio Network web site)

**Fake Numbers Station-** A fake pirate numbers station using a Brother Stair format is causing some interest in pirate DX circles. (None)

**Happy Halloween-** This station's screeching and wailing came back on the pirate band well after the Halloween holiday. (None)

**James Bond Radio-** With a format of James Bond movie themes, this strange one IDs only as "Bond, James Bond." (None)

**KIPM-** Relays of Alan Maxwell's elaborate "Illuminati" existential dramas still show up on the pirate band. Their announced Elkhorn maildrop is now closed. (None known)

**MAC Shortwave-** Paul Star's authentic and professionally produced replica of the old top 40 rock format operates on both 6850 and 6925 kHz. (Uses [macshortwave@yahoo.com](mailto:macshortwave@yahoo.com) e-mail)

**Mystery Radio Worldwide-** This dance music station appears to be a North American station that is different from the Europirate called Mystery Radio. (None known)

**Northwoods Radio-** "Broadcasting from the Great Lakes" with loon bird call interval signal, this rock and novelty music station remains active. (Uses [northwoodsradio@yahoo.com](mailto:northwoodsradio@yahoo.com) e-mail)

**Old Turkey Radio-** This novelty music station returned to the air around Thanksgiving once again this year. (None)

**Pirate Radio Boston-** Charlie Loudenboomer's pirate plays rather obscure rock music, often with Boston connections. (Uses [pirateradioboston@yahoo.com](mailto:pirateradioboston@yahoo.com) e-mail)

**Radio First Termer-** This documentary about rock music broadcast to American troops during the Vietnam war still shows up with relays on the pirate band. (None)

**Radio 6X-** This apparently new pirate has been relaying old Wolfman Jack border radio broadcasts. (None announced)

**Take It Easy Radio-** They almost always sign off with their theme song by the Eagles, but they also play other rock tunes. This one was among the most active North American pirates in 2006. (Merlin)

**The Crystal Ship-** The Poet at the "Voice of the Blue States Republic," still produces classic rock and leftist political commentary on highly variable frequencies such as 1710, 3320, 3346, 3275, 6875, 6854, 6925, and 9057 kHz. They claim to use 100 to 150 watts with various Viking transmitters. (Belfast and uses [tcsshortwave@yahoo.com](mailto:tcsshortwave@yahoo.com) e-mail)

**Undercover Radio-** Dr. Benway has been testing a high power mobile transmitter for his rock music "from the middle of nowhere." (Uses [undercoverradio@gmail.com](mailto:undercoverradio@gmail.com) e-mail)

**United Patriot Militia Bingo-** This parody of the long-busted KSMR Kentucky clandestine station has been heard on various weekends lately. (None)

**Voice of Captain Ron Shortwave-** Some of Captain Ron's DX commentary lately consisted of an analysis of the CHU Canadian time signal. He says that it doesn't sound like it used to. (Uses [captainronswr@yahoo.com](mailto:captainronswr@yahoo.com) e-mail)

**Voice of Influenza-** The announcer on this rocker claims to be so sick that he is barely able to transmit. (Belfast)

**Voice of the Runaway Maharishi-** Maharishi Ali

*Continued on page 61*

# Ragchewing Revisited

Last month, in addition to telling you about my dogs and grand-dog, I made some mention of adding a classic Icom IC-730 to my shack. And, if you have followed this column long enough, you know that I normally spend a lot more time working CW than using phone on the ham bands. That said, during the time I began to play with the IC-730 and integrate it into the shack here at N2EI, I began to rediscover the art (and fun) of the classic ham radio phone conversation, more commonly known as *ragchewing*. Of course, you can ragchew on CW and I often do, but even at a decent code speed clip, it can be hard to really emote and orate on a subject.

If you have met me at any of the ham radio and other radio hobby gatherings I attend each year, you are more than aware that I am seldom at a loss for words. I am happy to enter into discourse on any subject I know and ask copious quantities of questions about any subject I do not know. My Great Grandmother said I was vaccinated with a phonograph needle. (*Hmmm... note to self: what are modern verbose children vaccinated with? Laser beams?*) So, for someone like your humble author, talking comes easy and talking on the air only means keying the microphone and having at it.

I do often encounter folks, especially new hams, who are a bit shy when it comes to talking on the air. So how do we go about breaking down that verbal barrier to get a good ragchew started? Let's look at some simple ways to get things rolling. These ideas can help get you talking or can be used to get the ham on the other side of the QSO to open up a bit and make things more interesting.

### ❖ Look to Your Log Book

This can be done a number of ways, but a computer based logging system is a great help here. I use a database program of my own design (written in Microsoft Access) that allows me to query my log in several ways. Using these features and the program's built in "find" features, I can usually quickly discover if I have worked a ham in the past or if I have worked other hams from his general area.

Renewing an old acquaintance is always fun, especially if you made a few quick notes during the past exchange to help jog your memory. Instead of just swapping a signal report and local weather, you could say something like, "So Ralph, are you still using the Ten Tec Triton you had when we talked last June?" or "Steve, I recently worked Jon WB2KKS from

your town; have you ever run across him on the local repeaters?"

I find that I have worked quite a few folks in quick contest exchanges. It is great to be able to start off a more casual conversation by saying something like, "Well Jim, last time we QSOed was Sweepstakes; how did you do in the contest?" That can open up a whole line of conversation. A quick glance at the good old logbook can often start things rolling.

### ❖ Talk About Your Gear

Have you ever met a ham who didn't have something to say about his or her equipment? It's often no more complicated than reading off the name plates in front of you. We all do that as the second part of a routine exchange, right after the signal report. But next time you get on the air, try to go a bit deeper into the subject.

Since I build a lot of my own gear or modify commercial gear, it is not hard for me to come up with a couple of things to say. But if you are not big on melting solder, you can always talk about your accessories and especially your antennas. A topic I always enjoy (and learn from) is discussing how hams bring their feedline into their shack. Not everybody has a convenient window sill and a straight run to good earth ground. I like to hear how folks skin this particular ham radio cat. So, if you ever run across me on the air, you can expect me to ask about your feedline, how it holds up in your climate, what you are using in the way of a tuner, and how do you keep lightning out of your shack?

If you happen to run across a ham using relatively the same gear as you, I'll bet you have tons of stuff to talk about. For example, in last month's column I mentioned several known fixes and common modifications for the Icom IC-730. You can bet the first time I run across another IC-730 user we are going to have a lot to talk about.

### ❖ Local Ham News

I find most hams like to talk about the ham activities in their areas and hear about other folks' experiences. If you have recently had a hamfest, special event station or attended a local club meeting, these topics can be great conversation starters. Maybe your club is starting a new ham class. You can ask the ham on the other end if his or her club has ever done a class and what ideas would help.

I am always interested in hearing what kind of great deals people find at their local hamfests. It helps give me a sense of what the day was

like. And, again, it is yet another piece of ham radio equipment to talk about.

### ❖ Atlas Shrugged

Could it be that Atlas shrugged because he couldn't think of anything to say? Is Ayn Rand related to Rand-McNally?

OK, cheap attempt at high brow humor aside, every ham should have a good atlas on the desk. It just helps you figure out where the people you are talking to are located. In addition to several world atlas books, I always have a good domestic road atlas handy. You can find these in many stores that sell vacation oriented items.

Once I have a good idea from the QSO where the ham on the other end is sitting, a quick glance at the map will give me a couple of conversation starters. I can even find ways to work in my other radio hobbies related to the local topography. For example: "Bill, I see you live near O'Hare International Airport. I am a scanner monitor and I enjoy listening in on the activity from Philadelphia and McGuire Air Force Base. Do you have a scanner?"

I once took trip up to New England with the XYL and the Harmonics. Along the route, we planned to make several stops, including an amusement park. A couple of nights before the trip, I was talking to a ham in Massachusetts who happened to live just a few miles from the park we were planning to attend. In addition to getting many excellent tips on when to arrive, where to park and what rides were best for kids in my boys' age bracket, I got the chance to swing by his shack for a quick visit. Thanks to a quick glance at my road atlas, I got a chance to have a fun eyeball QSO.

### ❖ Know Your Local History

A few years back, my local library had a display about how the town I live in was used as a mustering point for Union soldiers heading off to join their units during the Civil War. I got more information about this from my local historical society, as well as some other information about the old train routes through the area that supported this mustering point. I have run across so many Civil War and train buffs on the bands that now I can very often open up quite a conversation using this bit of information.





Make a point of learning a little local history to fill out that simple QTH exchange with something of more interest. If you lead off the conversation in this way, you may very well get to learn some very interesting things about the history of QTH on the other side of the QSO.

## ❖ Other Hobbies – Other Conversations

In my years on the air, I have met very few hams who limited themselves exclusively to ham radio as their hobby. Most folks have interests outside amateur radio. Tossing out your other interests can open up all kinds of things to talk about. As I have said in the column in the past, I am a cyclist, kayaker, hiker and, most recently, geocacher. I toss these out and see what comes back my way. I seldom run into a dead end.

I added another topic to my conversation recently when the ham on the other side mentioned that he played guitar for fun. Well, so do I, and have since high school. But for some reason, until that other ham brought it up, I never considered it as a topic of conversation on the air. We had a great time talking about flatpicking, fingerpicking, and our favorite professional players.

So what if the ham on the other end has different hobby interests? Are you going to let that shut the conversation down? Even if I don't share the interest, I am happy to ask a few questions to learn a bit more. There are quite a few things in this world I'd still like to try before I go silent key, so learning from other folk's experiences is always high on my list.

## ❖ Time to Talk About My Dogs Again

I like to ask folks about their pets. I enjoy talking about my dogs and cats, and I find most pet owners feel the same way. Everyone has a couple of great stories about the animals in their lives and I always enjoy hearing about them. I once got on the air with a ham who was a canine police dog handler. It was great to ask him about training techniques. I was even able to use a few of his hints with my dogs.

## ❖ Read Any Good Books Lately?

I am a big fan of science fiction, non-fiction, history, and Sherlock Holmes. I never hesitate to ask folks on the air what books they are reading. And, again, even if it is a subject I am not immediately interested in, I am eager to hear why the other ham is enjoying that subject or author. If you do connect on a particular author or genre, you can probably find the basis for a QSO that will last a long way into the evening.

Combined with your atlas information, you may find you can try tossing out something like, "Frank, I just finished reading David McCullough's book '1776'; I see you live near where the Battle of Trenton occurred. Do you ever get over to Washington's Crossing State Park?"

That compound question can be answered on the level of literature, history, geography or recreation.

## ❖ Taboo Subjects

It's often been said that you should never talk about religion or politics (or... shhhhhh... sex) on the radio. Once I have had the time to get to know that ham on the other end of the radio a bit, I have had many enjoyable (and tasteful) discussions about all three from time to time. If you remember to respect the opinions and positions of the person on the other end of the signal path, and you don't try to force your views other than to explain where you're coming from, I find that there are no truly taboo subjects. Well, then again... don't bring up the "sideband wars" with any old timers. That can get fairly nasty.

## ❖ Have Fun

Having a conversation on the air that extends beyond the simple exchange of signal report, QTH, and local weather can open up a world of possibilities and opportunities. Maybe this time I'll see you on the phone portions of 40 meters.

*Watch this column next month for more on the FCC's recent rulings removing the Morse Code requirement.*

### UNCLE SKIP'S CONTEST CALENDAR

|                                                                                    |
|------------------------------------------------------------------------------------|
| <b>Vermont QSO Party</b><br>Feb 3 0000 UTC - Feb 4 2400 UTC                        |
| <b>YL-ISSB QSO Party</b><br>Feb 3 0000 UTC - Feb 4 2359 UTC                        |
| <b>10-10 International Winter Contest (SSB)</b><br>Feb 3 0001 UTC - Feb 4 2359 UTC |
| <b>Minnesota QSO Party</b><br>Feb 3 1400 - 2400 UTC                                |
| <b>Delaware QSO Party</b><br>Feb 3 1700 UTC - Feb 4 0500 UTC                       |
| <b>North American Sprint (SSB)</b><br>Feb 4 0000 - 0400 UTC                        |
| <b>ARCI Winter Fireside Sprint (SSB)</b><br>Feb 4 2000 - 2400 UTC                  |
| <b>CQ WW RTTY WPX Contest</b><br>Feb 10 0000 UTC - Feb 11 2400 UTC                 |
| <b>Louisiana QSO Party</b><br>Feb 10 1500 UTC - Feb 11 0300 UTC                    |
| <b>FISTS Winter Sprint</b><br>Feb 10 1700 - 2100 UTC                               |
| <b>North American Sprint (CW)</b><br>Feb 11 0000 - 0400 UTC                        |
| <b>ARRL School Club Roundup</b><br>Feb 12 1300 UTC - Feb 17 0100 UTC               |
| <b>ARRL Inter. DX Contest (CW)</b><br>Feb 17 0000 UTC - Feb 18 2400 UTC            |
| <b>CQ 160-Meter Contest SSB</b><br>Feb 24 0000 UTC - Feb 25 2359 UTC               |
| <b>Mississippi QSO Party</b><br>Feb 24 1500 UTC - Feb 25 0300 UTC                  |
| <b>North American QSO Party (RTTY)</b><br>Feb 24 1800 UTC - Feb 25 0600 UTC        |
| <b>North Carolina QSO Party</b><br>Feb 25 1700 UTC - Feb 26 0300 UTC               |

*Outer Limits continued from Page 59*

Ganja operates both this station and Radio Free Euphoria. Both stations program advocacy for drug use and rock music. (Belfast)

**VOTL-** Veteran pirate broadcaster Mike O. Farad has resurfaced with this new station. The call letters apparently stand for the Voice of the Lutfisk, a Norwegian fish delicacy. (Uses [votl\\_radio@yahoo.com](mailto:votl_radio@yahoo.com) e-mail)

**WAIR-** Also identifying as All Indy Radio, this is another pirate with a station name using a pun of a licensed broadcaster. (None)

**WBNY-** Commander Bunny, the head of the rodent revolution still mixes clandestine parodies, digital mode broadcasts, pirate radio commentary. He regularly plays Easter music, regardless of the calendar date. (Belfast?)

**WDDR-** This veteran rock music often features audio from the old Outer Limits TV show. Recent broadcasters warned listeners of dire consequences for anybody who tunes in their programming. (Belfast and uses [ericblair@wddr1027.com](mailto:ericblair@wddr1027.com) e-mail)

**WHYP-** The James Brownyard memorial station is back with rock music, pirate radio humor, and noises from the announcers at the original WHYP-AM in North East, PA. (Belfast and uses [whypradio@gmail.com](mailto:whypradio@gmail.com) e-mail)

**WMFQ-** This one is the only station in shortwave history whose purpose has been to promote the QSL process. Oddly, their Providence address is now closed. (Try Belfast)

**WTPR-** Otherwise known as Tire Pressure Radio, this one transmits advocacy for keeping proper inflation in your car tires. (None)

## ❖ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign locations, especially in Europe where the value of the US dollar has plunged considerably. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses, identified above in parentheses: PO Box 1, Belfast, NY 14895; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 69, Elkhorn, NE 68022; PO Box 146, Stoneham, MA 02180; and PO Box 293, Merlin, Ontario N0P 1W0. Unfortunately, PO Box 69, Elkhorn, NE 68022 is no longer a valid address.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletin for submitting pirate loggings with a hope that pirates might QSL is now the e-mailed Free Radio Weekly newsletter, still free to contributors via [yukon@tm.net](mailto:yukon@tm.net). A few pirates will sometimes QSL reports left on the Free Radio Network web site, at <http://www.frn.net> on the internet.

## ❖ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: Jerry Berg, Lexington, MA; Artie Bigley, Columbus, OH; Dean Burgess, Manchester MA; Wendel Craighead, Prairie Village, KS; Richard Cuff, Allentown, PA; Gerry Dexter, Lake Geneva, WI; Rich D'Angelo, Wyomissing, PA; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; Nick Grace, Washington, DC; William T. Hassig, Mt. Prospect, IL; Harry Helms, Smithville, TX; John Herkimer, Caledonia, NY; Ed Kusalik, Coaldale, Alberta; Chris Lobdell, Stoneham, MA; Larry Magne, Penns Park, PA; Greg Majewski, Oakdale, CT; George Maroti, Mount Kisco, NY; A. J. Michaels, Blue Ridge Summit, PA; Gary Neal, Wichita, KS; John Poet, Belfast, NY; Fred Roberts, Germany; Martin Schoech, Eisenach, Germany; Steven J Robeson; Winchester, TN; Robert Ross, London, Ontario; John Sedlacek, Omaha, NE; Lee Silvi, Mentor, OH; Ronnie Stroup, Medina, OH; and Joe Wood, Greenback, TN.

## Popular and Useful HF Antennas

**V**arious types of high-frequency (HF) antennas seem to be perennial favorites with radio enthusiasts such as short-wave listeners, broadcast-band DXers, and ham-radio operators. Among these antennas are the half-wavelength dipole, inverted-V, random-length, small table-top loop, and active antennas. The reason these antennas are popular are that they are inexpensive, are relatively easy to construct, have enough gain for use on HF the band, and – bottom line – they are effective.

### ❖ Half-Wavelength Dipole:

We'll discuss the most common of the many different dipole designs: the center-fed, half-wavelength dipole (fig. 1A). This antenna is cut to a half wavelength as given by the formula:  $\text{Length(ft)} = 468/\text{frequency (in MHz)}$ . For example, at 10 MHz the length would be  $468/10$ , or 46.8 ft. In meters the formula is:  $\text{Length(m)} = 143/\text{frequency (in MHz)}$ .

The nulls (directions of low response) which are present in a dipole's free-space horizontal radiation and reception (R&R) pattern tend to lessen considerably when, as is typical, the antenna is raised a few tens of feet above the earth. Thus used, this antenna performs fairly well toward all compass directions, yet with some directivity favoring directions perpendicular to the antenna's length. Mounted a half-wavelength above ground, it is a decent DX antenna, and mounted a quarter wavelength above ground it is good for working close-in stations up to 150 miles or so distant. The length of a half wavelength in air is:  $L(\text{ft}) =$

$492/\text{frequency(in MHz)}$ , and  $L(\text{m}) = 150/\text{frequency (in MHz)}$ .

### ❖ Inverted-V Antenna:

In construction, the inverted-V dipole (fig. 1B) is essentially a half-wavelength dipole with its ends drooped near the earth so that the antenna halves are angled at somewhere between 90 to 120 degrees to each other. The horizontal R&R pattern of this antenna is essentially non-directional.

Many who build this antenna use the same length formula as for the half-wavelength dipole with good results. However, lowering the ends does affect the antenna's resonant frequency, and Joe Carr recommends a total length, in feet, around  $440/\text{frequency (in MHz)}$ , or, in meters,  $134.5/\text{frequency (in MHz)}$ .

### ❖ Random-Length Antenna:

The random-length antenna (fig. 1C) is the easiest to design in that it consists simply of a convenient length of wire hung as high as practical. This antenna is sometimes considered a sort of general-use antenna, and is useful from the low frequency band through high frequency. At times it is even used at VHF.

Its R&R pattern is difficult to predict, as it will be determined by the antenna's length, its height above earth, and by the surrounding environment. In my experience, the higher and longer the antenna (at least up to a couple of hundred feet in length), the more stations you hear or contact.

### ❖ Table-Top Loop Antenna:

This small antenna (fig. 1D) can be positioned on or near the operating table. It is almost invariably used as a receive-only antenna, and is popular with broadcast-band DXers. Various models are designed for frequencies from the LF through the HF band. If interference is arriving in a different direction from the station you want to receive, then this antenna can be rotated such that its horizontal-pattern nulls reduce that interference.

We won't have space in this column to discuss building this antenna, but a future column will be devoted to small loops.

### ❖ Active Antennas:

An active antenna (fig. 1E) is a receive-only antenna consisting of a low-noise, radio-frequency amplifier, and a short length (usually only a very few feet) of wire, or a telescoping whip as the antenna element. Attempting to transmit with this antenna will destroy the antenna's amplifier.

This antenna is convenient for use indoors, and its performance will usually rival that of a very much longer outdoor antenna. Its horizontal R&R pattern in most installations should be relatively non-directional. The downside is that strong signals can overload the amplifier circuit and cause overload and inter-modulation distortion.

Again, we won't have space in this column to discuss building these antennas, but a future column will be devoted to active antennas.

### ❖ Using Antenna Tuners:

For reception on HF and lower frequencies, antenna tuners are typically of little to no value for improving reception. When tuned up, they increase received-noise levels just as much as they do the strength of the desired signal. Thus, the quality of reception, or readability of signals, doesn't improve. As long as you can hear a significant decrease in background noise when you disconnect your antenna, increasing the output from your antenna system doesn't generally improve reception. For transmitting, however, antenna tuners usually make a significant contribution to efficiently transferring power from your transmitter to the feed line.

### ❖ Let's Build an Antenna!

Any bare wire that is strong enough to

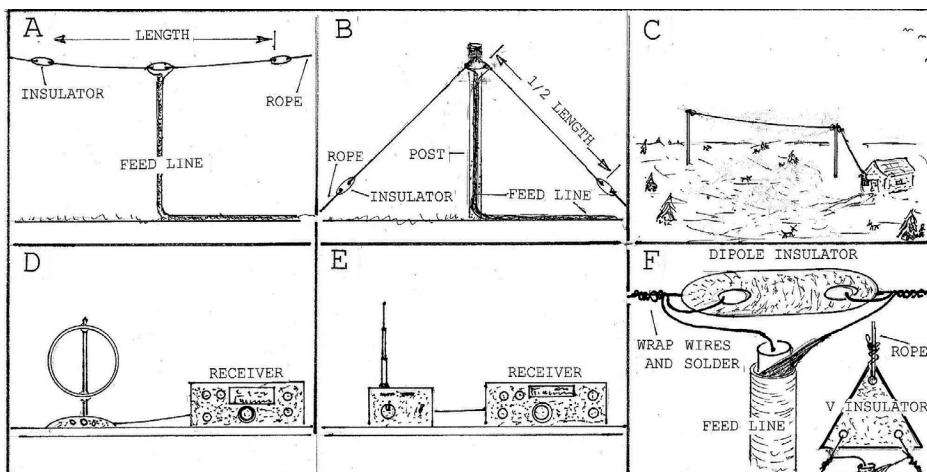


Fig. 1. A half-wavelength dipole antenna (A), an inverted-V antenna (B), a random-length antenna (C), a table-top loop antenna (D), an active antenna (E), detail on attaching dipole and inverted-V insulators and feed lines (F).

#### This Month's Interesting Antenna-Related Web site:

Here's a site with info for selecting an antenna. It has more than you want to know, probably, but is worth reading:

[www.astronwireless.com/antnel.html](http://www.astronwireless.com/antnel.html)

Want to build an antennascoper? (See riddle below):

<http://translate.google.com/translate?hl=en&sl=it&u=http://digilander.libero.it/hamweb/risorse/antennascope.htm&sa=X&oi=translate&resnum=3&ct=result&prev=/search%3Fq%3D%2B%2522%2Bantennascope%2522%2B%26hl%3Den%26lr%3D%26sa%3Dg>

This last address is so long to type you may want to try to find it by using Google™. Just enter "antennascope," in Google, and click on "translate this page" for the site which Google brings up, titled "Hamweb - L'Antennascope di W2AEF."

For more on antennascoper building:

[www.qsl.net/we6w/projects/Ant\\_scope.txt](http://www.qsl.net/we6w/projects/Ant_scope.txt) and  
[www.kkn.net/archives/html/QRPL/1998-02/msg01970.html](http://www.kkn.net/archives/html/QRPL/1998-02/msg01970.html)

last in your installation will be OK as the antenna element. Insulated wire works, too, but shortens the length required to make the antenna resonant (in tune).

For both end insulators and center insulator, pull the wire through the insulator and back around itself as shown in figure 1F. Scrape off any insulation where the wire crosses itself and solder it and all connections for reliable service. Solder the feed line in place as shown,

and weather-proof the end with some coax sealant.

A dipole's feed-point impedance generally varies significantly with the height of the antenna above earth. The inverted-V feed-point impedance varies, as its ends are lowered. You can check the *ARRL Antenna Book* for more on these factors. To avoid getting too involved in checking your antenna's feed-point impedance, 50-ohm or 75-ohm coax will work as feed line for either the dipole or inverted-V, with 50 ohm being favored for the inverted-V, and 75-ohm for the dipole. Using poor-quality coax may lead to significant signal loss.

The random-length antenna needs no feed line. Usually one end of this antenna is connected directly to the receiver's antenna-input connector.

If you live in country where lightning is likely, then don't forget lightning-induced damage protection. Disconnecting and grounding the antenna when it is not in use, and never using the antenna when lightning is likely, are good precautions. Lightning-induced damage protection devices are available from most radio supply houses.

A magnifying glass for inspecting antennas. (B) A telescope used to view high, out of reach antennas. (C) A whip antenna whose sections fit together like sections of a telescope. (D) None of the above."

Well, an antennascoper is a simple device which, when used in conjunction with a very low level of RF power from a grid dip meter or perhaps from a signal generator, can be used to determine the feed-point impedance of an antenna. Typically it is used in the HF or MF frequency range. So, the answer is D!

#### This Month:

OK, we know what an "antennascoper" is, so now what is the "grid-dip meter" or the "signal generator" mentioned above?

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

## RADIO RIDDLES

#### Last Month:

I asked: "What is an 'antennascoper' (A)

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## More Radio Data Books for Your Library

Once again I apologize for having had to interrupt the Trans-Oceanic B600 restoration story, last discussed in the November column, because of my hip surgery. Recuperation is well underway now, however, and I've been able to return to the workbench. But before I get into this month's progress – some notes about our readers.

**William Bacon** (Mt. Ephraim, NJ) noted, in the November column, that my Trans-Oceanic was missing its spring-loaded power-cord take-up reel. He e-mailed me with an offer of one from his parts set and wouldn't accept payment except for postage. Bill also provided a cabinet foot to replace my missing one – thus helping me correct my radio's annoying and unstable tilt.

One evening, not long after completing the arrangements to receive the parts, my phone rang. It was another reader offering a cord reel! I didn't have the presence of mind to write down his name, but he is a dyed-in-the-wool T-O collector and has at least one example of every model made.

He also responded to a question I had posed about how to keep mold from re-growing on the surface of the cabinet after it had been once cleaned off. His solution: rub clear shoe polish into the surface. He knows it works because he forgot to do the bottom of the first set he treated this way. Guess where the mold grew back!

**Derick Ovenall** (Wilmington, DE) Sent me some very interesting long, chatty e-mails about his adventures in restoring an 8G005Y T-O. I particularly enjoyed his description of the anxious moment he experienced while adjusting one of the oscillator coils. In search of the perfect adjustment, he screwed the powdered-iron slug so far into the coil that it dropped out of the threads and bottomed out. However, the slug was still upright, so he tried putting a drop of super glue on the tip of a screwdriver of just the right size to engage the slot of the adjusting screw and went fishing. Much to his delight and relief, he was able to raise the screw and reengage the threads.

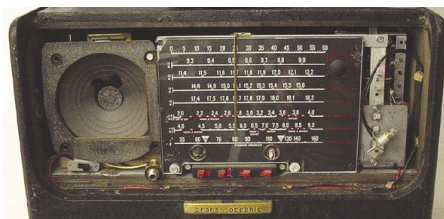
**Charles Mihle** (The Woodlands, TX) writes that he has three leather-covered L600 T-Os and hopes to restore two of them. Though new to the hobby, he is slowly acquiring equipment for his bench, has attended radio repair classes, and is doing some independent study to get the background he needs.

**Mike Martel** writes of his pursuit of a good substitute for the defunct 1L6 in his

T600 T-O. This is an issue we'll be eventually discussing in the column – but the short answer is that, while stopgap replacements for this rare tube are possible, there seems to be no perfect alternative to biting the bullet and purchasing the real thing.

### ❖ Back to the B600 - Removing the Chassis

This essential first step in any radio restoration is hardly worth mentioning for most radio models, but the Trans-Oceanic is a little different. It doesn't require rocket science, mind you, but there are a few quirks to look out for. Step one is easy: pull off the two knobs. There are no frozen Allen-head setscrews to deal with as in some communications equipment – they're just ordinary friction-fit radio knobs.



*Removal of the front panel facilitated freeing the pilot light assembly (here seen at lower right) from the chassis (see text).*

Opening the back of the radio, it is obvious that the connections to the broadcast loop and short-wave whip antennas have to be removed. No problem here. Both are fitted with small plugs that can be eased out of their sockets. Applying some gentle leverage with a small screwdriver will help.

Now the whip antenna itself, along with its mounting hardware, will have to come out to clear the path for sliding out the chassis.



*The B600 chassis after removal from cabinet.*

The hardware is held in place by two unaccountably long machine screws. So long that I suspected that they might be non-original

and a sign of previous tampering.

Some time I'm going to have to replace my nutdriver set with one having hollow shafts! The driver wouldn't slide down far enough over the long screws to engage the hex nuts. I had to resort to backing off each nut far enough with needlenose pliers so that the driver could do its work. Once the assembly was removed, I could see that these machine screws were indeed original – their heads being permanently fastened to the cabinetry.

Two screws (one missing) fasten the chassis to the shelf on which it sits. The problem was that the battery compartment under the shelf is only a few inches high. Little clearance for a screwdriver. I spent a lot of time looking for a stubby screwdriver and when I found it, it was too tall for the space. That's when I discovered the holes drilled through the cabinet bottom directly under the chassis mounting screws. Very grateful to the thoughtful Zenith engineer responsible for them, I quickly removed the fastener using an ordinary screwdriver.

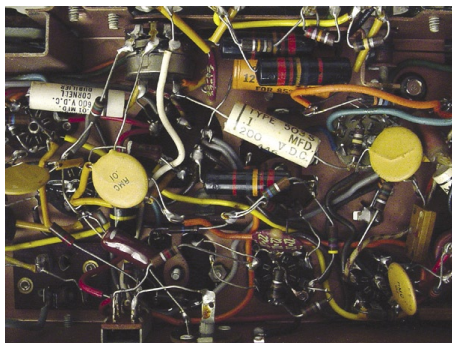
I also removed the screw holding a bracket at the top of the coil assembly to the underside of the cabinet top and the fasteners holding the headphone jack and the pilot light switch to the front panel. It now seemed that there would be no further obstacles to the removal of the chassis, but I was still feeling resistance to sliding the unit back and out. Not wishing to force anything, I decided to remove the front panel so I could get a look at what was hidden behind it. It was a simple matter of taking out about seven tiny wood screws.

The problem turned out to be the dial light. While it is mounted on a chassis bracket in the usual manner, it is not wired into the radio but connects to a plug in the battery compartment. It needs to stay with the cabinet. The light is strictly battery operated, even when the set is running on plug-in power. Removing the light from the bracket and snaking it free of the radio chassis did the trick.

The chassis was now free to slide out, although the loop antenna had to be pushed up and removed because the top of the dial assembly was catching on the loop's pivot pin. This is the pin that is inserted into a hole provided in the carrying handle when it is desired to rotate the loop atop the cabinet.

### Under The Chassis

At last I was able to satisfy my curiosity and get a look under the chassis. I was impressed. For one thing, it is probably the clean-



A portion of the B600s meticulous wiring. Sprague Black Beauty "bumblebee" capacitors are identified by their black bodies and color code stripes (not to be confused with the much smaller resistors).

est chassis I've ever worked on. For another, construction quality is top notch. Component layout was beautifully arranged and every solder joint looked perfect – beautifully flowed and still bright.

A little bit daunting is the density of the wiring – which is going to make replacement of some parts a bit of a chore. Offsetting that is the absence of those wax-sealed paper capacitors which, as far as I'm concerned, should be replaced on sight. A good many of the bypass and coupling capacitors are ceramic or mica types that almost never need replacing. The rest are tubular types of relatively modern vintage that can probably be left alone – except for the six or seven Sprague "Black Beauties."

If you've never seen a Black Beauty before, it is a tubular capacitor in a black plastic housing. Its value is not printed on the barrel in plain English, as is usually the case, but indicated by an arrangement of color coded bands similar to the color codes used on resistors. Black beauties look well-sealed and impervious to the moisture infiltration that ruins ordinary wax paper capacitors. But their failure rate is legendary and few experienced restorers would let them remain in a radio.

These capacitors apparently were never really widely used, because I wasn't able to find color charts for them in any of my usual reference books. Looking around on the Internet, I found the chart shown with this article at several sites; it has an often-copied-over look, but it does convey the necessary information.

Looking around on the 'net for this chart, I discovered something interesting. Vintage guitar amp enthusiasts love the Black Beauties, which they call "Bumblebee" capacitors

because the color code bands remind them of the stripes on that insect's hind section. There are even rebuilders who make modern replicas for those who wish to keep the innards of their amps authentic.

### Preliminary Moves

I began by checking the tubes. A couple were slightly weak, but not enough so – I judged – to be a problem. That rare 1L6, I'm happy to say, was perfect. And the 50A1 regulator tube – another hard to replace item – showed the expected continuity.

Since the dial drive was very stiff, I began by placing drops of oil on the shafts of all idler wheels and the front bearing of the tuning capacitor. That loosened things up considerably. Then I sprayed contact cleaner on each of the many slide switches in the band change assembly, working the switches back and forth as I went.

I wanted to avoid, if I could, having to change out the big 4-section electrolytic capacitor. The connections to it are half-buried under other wiring. Not only that, but finding a spot for a large terminal strip to hold the four individual capacitors that would be necessary to replace the multi-section unit would also be a problem.

And so I decided to try something I hadn't done in years: applying power to a radio before replacing its complete complement of capacitors. Connecting the line cord to a combination Variac and isolation transformer (the latter to avoid danger from a "hot chassis" – this being an a.c.-d.c. set), I applied 10 volts to the radio – then increased the voltage by ten every ten minutes.

If the electrolytic still had life in it, this would give it an opportunity to slowly "reform" (rebuild its internal electrolytic insulating film).

To monitor my success, or lack of it, I connected a voltmeter to the output of the radio's selenium rectifier. At full line voltage the schematic specified 100 volts d.c. here. Any significant departure from that would signal a short. As I slowly eased the line voltage up, the d.c. voltage increased smoothly. Finally, at a full 120-volt line input, the d.c. reached the specified 100 volts.

There was still no sound from the speaker – even at the maximum setting of the volume control. But after some experimental punching of bandswitch buttons, the set came to life on the broadcast band. With the broadcast loop temporarily plugged in, I was able to pick up

stations all over the band. The audio did sound slightly distorted on all but the most bassy settings of the tone control, but there was no hum that might be indicative of a bad filter electrolytic.

There was no reception on the other bands, even with a long wire connected in place of the shortwave whip antenna.

### ❖ What's Next

I'll be replacing all of the "Black Beauties," all of the other tubular caps that are reasonably accessible, and the one individual small electrolytic. The selenium rectifier, a definitely untrustworthy component, will be replaced with a silicon diode. If the audio seems to have smoothed out after that, I'll realign the i.f. transformers and check for reception on the other bands with a decent antenna connected.

Otherwise, I'll first troubleshoot the audio problem, beginning with a check of all tube voltages. Once I have good audio, an aligned i.f. channel and shortwave reception, I'll check the adjustments of the r.f. and oscillator trimmers per factory instructions.

From a mechanical point of view, I'll clean the chassis top and, while the cabinet is empty, remove all traces of dust and mold from the inside. Both the inside and outside will be deep cleaned with Murphy's oil soap and the "Black Stag" fabric covering the outside will be treated with clear paste shoe polish.

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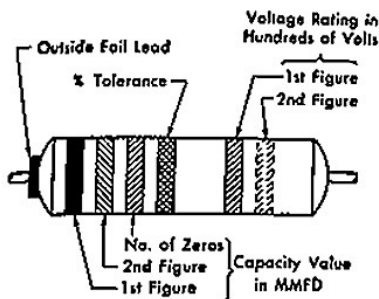
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Example. 0.0047 MFD, 1,600 V D-C,  $\pm 20\%$

| Band | Color Code |            |
|------|------------|------------|
| 1st  | Yellow     | 4          |
| 2nd  | Violet     | 7          |
| 3rd  | Red        | 00         |
| 4th  | Black      | $\pm 20\%$ |
| 5th  | Brown      | 1,600 V    |
| 6th  | Blue       |            |

| Color  | Significant Figure | No. of Zeros | Capacity Tolerance |
|--------|--------------------|--------------|--------------------|
| Black  | 0                  |              | $\pm 20\%$         |
| Brown  | 1                  | 0            |                    |
| Red    | 2                  | 00           |                    |
| Orange | 3                  | 000          | $\pm 30\%$         |
| Yellow | 4                  | 0000         | $\pm 40\%$         |
| Green  | 5                  | 00000        | $\pm 5\%$          |
| Blue   | 6                  | 000000       |                    |
| Violet | 7                  |              |                    |
| Gray   | 8                  |              |                    |
| White  | 9                  |              | $\pm 10\%$         |

Black Beauty color code chart. Follow the example in the center to make it all clear.



## On the Technical Side

In going through computer files and manila folders, I found a number of interesting letters from readers that, for one reason or another, never made their way into a final printed *Letters to the Editor* column. Because the following letters address technical questions and tips, we print them in this special *On the Bench* column consisting of your hints, tips, and questions – especially about antennas!

### ❖ Going Mobile on SW

"I read Ken Reitz excellent review of the Sony XR-CA660X. [June 2006 issue and also now online at [www.monitoringtimes.com/html/mtrevujun06.pdf](http://www.monitoringtimes.com/html/mtrevujun06.pdf) ed.] I assume it works like the predecessor Sony XR-CA640X which I have in one car (Philips DC 777 in my other car). The instructions on these Sonys are not clear, but you do not have to just seek out frequencies. You can hold down the seek- or seek+ or whatever it is named, and manually tune up or down.

"You don't have to try to seek a strong station, but can go to a specific frequency. With AM in 9 kHz increments, you can tune off frequency by manually going to whatever is closest to a station you want, but the actual seek on MW will be of little value in North America – but again you can manually tune almost anything you want by going to 2 or 3 kHz off target. The radio is as good as almost any high priced portable."

– Jethro Bodine Jr



*Sony XR-CA660X installed in-dash and tuned to BBC World Service to Africa on 15.400 MHz. Clean lines, easy operating and excellent sound quality are Sony hallmarks. (Courtesy: Ken Reitz)*

"I read your Sony XR-CA660X review in the June MT. I have the XR-CA640 which is the predecessor to the '660. I have been enjoying mine for a couple years now. Mine does have the 9/10 kHz switch, but what is a kHz between friends? My biggest gripe with this unit is that tuning is limited to 5 kHz steps in SW bands, a 1 MHz manual step would be nice especially when you want to enter known freqs into memory.

"Also coverage up to 25 MHz would be a plus, since some broadcasters are in that range. (BBC on 21.470, for example.) Obviously these were intended for casual listening on SW. If I really want to get serious I will have to upgrade my ham license and install an HF rig.

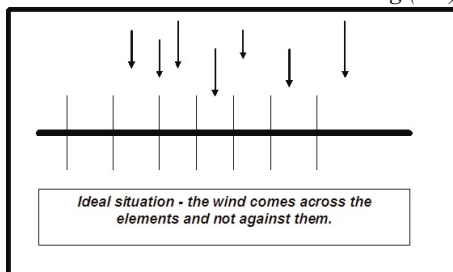
"There is one alternative you didn't mention; that is Ten-Tec which makes a SW radio kit that operates on 12vdc. They were being sold already assembled for around \$290.00.

"As for the poor audio quality, I have had good luck with an FM RF modulator like the ones used for out-board CD/MP3 players, connected to the earphone jack. I had a set-up once that split the left/right channels between the SW receiver and a scanner and fed it into the existing car stereo. When I replaced my car, I installed the Sony 640, and I now use a separate amplified speaker for the scanner.

"And shame on you, there is empty space in your photo under the stereo, where is the scanner, ham rig etc.? (hi hi). Those wiring kits you mention are also available at Circuit City and, at least in the case of my PT Cruiser, are 100% plug and play. There are the same harnesses for these speakers in case you want to upgrade them to match the new stereo.

"Good article, keep them coming."

– Craig (Pa.)



### ❖ A Poor Man's Wind Sock

"If you have a beam or several beam (Yagi) antennas on a tower, it is prudent to face the antenna elements *with* the wind rather than broadcast *against* the wind (particularly in high winds) so the elements don't break off or bend. It's easily done with your antenna rotor.

"A 'poor man's' wind direction finder (wind sock) can be a large plastic trash bag – they come in various colors to 'blend in.' Cut a few small holes in the bottom to release any air or water."

– Richard Mollentine WA0KKC, Overland Park, KS

### ❖ Antenna Experimenting

"About three years ago I bought an AOR 8600 wideband receiver as a back-up or spare receiver that I could hold or keep all the frequencies that I might use from 500 kHz to 2 MHz. I have three shortwave receivers and three scanners all for different purposes. If one of my main receivers went out I wanted a back-up.



"To get the AOR8600 to perform properly I had to experiment with numerous antennas. I saw the AOR SA7000 but could not afford to buy one. I picked up the dimensions of the SA7000 and have been experimenting ever since. I picked up one of those mobile FM-TV mobile antennas which is a 'V' type antenna with two small whips. I changed the whips and mounted it on a pipe 20-ft long. Now I had a homemade SA7000 inside my apartment and it works okay but could have more gain. I am working on that.

"Re March issue 'On the Bench' [*Build the Flexenna for Wideband Reception*]: I do not want to take away from your article, only add an apartment dweller's perspective or ideas. I am a cheapskate and experimenter. I use two magnet mount antennas with 3/8-inch threaded mounts. One is a six-foot loaded whip (CD) plus an 18" cellphone antenna with the open coil in the middle. Because I use 3/8 threaded mounts, I can interchange antennas as I find something better.

"As per your article, I am still experimenting – loaded whip antennas vs. dual long vertical wires, indoor vs outdoor, etc.

"Have you seen Comet UHV-6 mobile antenna which claims to have good coverage and not a lot of gain?

"I also enjoyed your *MT Review* [in the same issue] on the Comet-CHA-250B vs the GAP Titan for those that can use it. When I had a house I had a HyGain All Band vertical. For those of us who are restricted these types of reviews are very informative."

— A Humphrey, Colbourne, Ont CA

## ❖ Getting Grounded

"Thank you for the great article in *Antenna Topics* in November 2006 on grounding. I have wrestled with how to design an electrical and RF ground for our home in the Adirondack Mountains of Upstate NY. We have only 16 to 24 inches of dirt (duff) on top of ledge rock. This whole area was carved out by the receding glaciers a few years ago. I have used the information presented in the PolyPhaser booklet 'Lightning protection and Grounding Solutions for Communication Sites.' There is an excellent section on Amateur stations.

"My shack is on the second floor (12 feet above the ground). I used a 3/4 copper plumbing pipe running the length of the shack desk (25 feet). I hooked all of the radios, amplifiers, etc to this pipe by tinned copper 1/2 braid.

"I had at my disposal several hundred feet of #4 solid copper wire. I used this as follows:

1. From the telescoping TriEx tower (20 to 60 feet) base into three radials with five- 6 foot copper (coated steel and solid copper) ground rods run down to the rock and then out horizontally.
2. I used a Ufer technique for the concrete base and tower base mount tying the copper wire into the rebar. I know some people have had problems with their concrete base exploding with a sudden surge, but I had 10-1/2 feet of 1 inch rebar which gave me a total of 85,575 surge amps (8150 surge amps/foot). PolyPhaser recommended protection to 60,000 amps level as being desirable and offers 90%

protection against all lightning strikes. It's the 10% that one has to worry about.

3. All of my coaxes for the beam, rotor control wires and 2m Yagi come through PP arrestors on heavy grounded copper plates.
4. I constructed a complete house perimeter ground system hooking all of the tower radials, house grounding plate, utility, phone, cable, and generator grounds together to create the same impedance. The resistance is way less than 1 ohm. The ground is moist most of the time as is the ledge rock.

"I want to build a dipole for 160, 80, and 40 meters possibly of the fan type and center feed it with coax and a 1:1 balun. I looked at the Carolina Windom and they recommended using a line isolator. Is this the same as your description of the coaxial ground? Right now I have my #4 copper wire running from the desk pipe down to the perimeter house ground (about 12 feet in length). I understand that this would be ok for all except the 10 and 15 and possible 20 meter band where the grounding wire may act as an antenna.

"I would like to make a coaxial ground as you describe using the .001 microfarad at 1KV at each end of the braid to center conductor. I was unable to find such a capacitor. The highest DC rating was 500WVDC. Is this good enough? I usually run under 300 watts, but would like to run higher if necessary (1 kW). Radio Shack did not have this type in multilayer disc form, nor did Digi-Key. Where can I purchase the proper capacitor?

"I would rather build than buy the dipole antenna for the three bands above. Space is not a problem for the dipoles. What would be your recommendation for the dipole construction, balun, line isolator, and use of MFJ artificial ground.

"Sorry I have been so long winded, but in our area where brownouts and surges as well as thunderstorms are frequent I thought I needed as much protection as possible.

"I am relatively new to amateur radio in a serious way. I was initially licensed while in the Navy on Guam."

Van Jackman WA2DPM

(Ed Note: Clem Small will address some of Van's questions in a future issue.)

## ❖ What's This?

"I recently came across photos of some old radios I had owned, including this one which I never did know exactly what it was. It had a box to mount in car with a key to unlock and take it out. It could be taken into the house and either plugged into the wall or operated by battery. As I recall, I had this radio in the late 1960s or early -mid 1970s. Not certain exactly.

"If you have any idea what model or era this was, I would appreciate your letting me know. It was an excellent receiver with LW MW & SW & FM. Thank you,"

— Jeff Hollis, Martinsburg W. Va.



"Interesting set! I have no info on it – and am fascinated by the presence of the low band, usually found only on European radios.

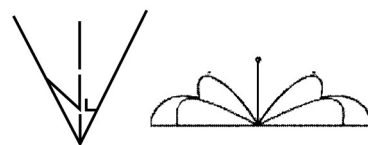
"Maybe the receiver was also meant for use in small aircraft or boats as a means for picking up weather, beacons etc.? (Just a wild guess)."

— Marc Ellis

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## What's That Antenna?

**W**e have had a number of recent queries about antennas, many of them wondering about odd configurations and what they might be. Bob Grove provides his first thoughts on these, but if any of our readers have other ideas, please feel free to email us or write c/o Monitoring Times.

This is a follow-up to a Canadian site that was identified in the April 2002 issue of MT (see

pictures in the first column):

"I checked the 'truck monitoring radio site' in Oona, BC, in August. It has never been used. Since the photos published of it in *MT*, the alders have grown 8-10 ft high. To get this photo, I had to climb onto one of the loops.

"Terion sold the site to a lady in Florida. No rent has been paid for three years, and the lady doesn't respond to e-mail from the owner

of the land. He's not worried about this, 'cause an unused \$60,000 diesel genset is on the site. There's probably nearly a mile of Belden 8267 coax with N connectors on site, and the landowner told me, 'Help yourself'! I have!"

— 73, John Musgrave, Oona River, BC, Canada

"Does anybody know anything about 'ICE Station Otto'? I came upon this place off of Highway 41 just north of Moriarty, New Mexico. It appears abandoned. However, the company listed on the sign, Val Comm Inc., is still around. Here is a link to their site: [www.val-comm.com/main/about.html](http://www.val-comm.com/main/about.html)

"I'm surprised by the lack of information about it on the internet, as it is right next to the





highway, so it is very easy to notice. Google Earth puts the site at the following coordinates: 35 degrees 04' 22.46" North; 106 degrees 00' 32.50" West

"Sorry for the poor quality of the photographs, but the camera on my cell phone was the only thing I had.

— Robert Kornovich (long-time reader), AC7XP

The system was proposed to evaluate the comparisons between INMARSAT and the ATSS3 satellite communications systems. You can see the original proposal at:

[www.osti.gov/bridge/servlets/purl/10185726-eLaERE/10185726.PDF](http://www.osti.gov/bridge/servlets/purl/10185726-eLaERE/10185726.PDF)

Bob Grove

"I'm hoping Larry (or someone in B-town) has an idea what these antennas in Alfred, NY, are used for."

— Kevin Carey



"Interesting arrays. The big towers are, of course, badly damaged or deteriorated with more than a dozen elements broken or missing. I don't see any trace of coax going up the towers or attached to any element, so it must be a passive (reflective) array of some sort.

"Ordinarily, this would be directed toward some type of antenna, but the pictures don't tell us what the positional association is between the tall towers and the other antennas.

"Since all of the VHF beams are horizontally polarized and pointed at different directions, I'm sure it's a TV reception setup, possibly for cable service. The dish antennas would seem to corroborate that thesis."

Bob

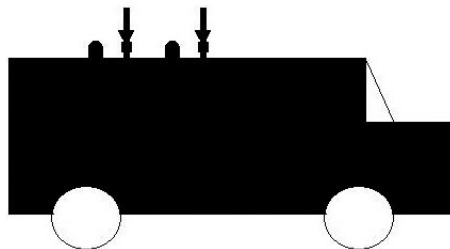
"I was on the road at work today and, for a brief time, followed a black Chevy Suburban with the rear and back side windows tinted. The truck had 'N' series U.S. Government motor pool tags. What caught my eye was the unusual antenna configuration on top (see attached very rough drawing).

"All were flat black and the dual configuration makes me think some sort of direction finding gear. The little 'radome' and odd shaped vertical made me think of a loop sensed cardioid array but why two of them? Any thoughts on what this might be?"

— T.J. "Skip" Arey N2EI

It's quite possible that the two vertical elements are the co-phased antennas to give the cardioid directional pattern, or they may comprise two separate arrays for two different parts of the spectrum, like VHF high band and UHF.

— Bob



"Thought you would be interested in the antenna I spotted in front of the Waldorf Hotel (NYC) this morning (where Bush was staying on day in September).

"It was atop a hydraulic boom projecting from a military Hummer with the license plates duct-taped out, on Park Avenue just behind the NYC Police Communications Bus with a fence around it. Note also the upside-down mini-discone (?) to the side below the main one.

"What type antenna am I looking at? There was a typical discone lower down on the Hummer's roof, also."

— Rob Strong, NY Reader



The antenna is called a biconical array, not a discone. The flared elements emulate a 'fat' vertical dipole, giving it wide frequency coverage with little change in impedance match.

— Bob

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## Kaito KA1102 vs Eton S350DL Comparing Two Under \$100 Portables

I must admit up front that I have never been much of a fan of head-to-head comparisons of radio equipment. To me they are more than a bit unfair to the manufacturer of the radio that “loses” in the comparison. It may be a fine radio; it just doesn’t measure up to the radio it is being compared with in the eyes of the reviewer.

So, when I was asked to do a series of shortwave portable comparisons for the Grove Tech staff, I was, well, a bit apprehensive. Therefore, before I step into the first installment in an *MT* battle of the shortwave radios, let me present a few caveats so that you will understand the limitations of this type of review.

- 1) Low end portable specifications can vary from batch to batch, making a subjective call on the entire manufacturing run difficult.
- 2) Quality control for lower end radios can vary from unit to unit, and may not represent the entire production run.
- 3) Some specs (i.e. such as audio quality, ergonomics, color selection, usefulness of synchronous detection) are purely a personal preference. What I like, you may not. What I hear, you may not.
- 4) While portable radios are nice, they are not DX machines. Anything below about \$500 in price is aimed more toward the casual or program shortwave listener, not the DXer or hard core utility listener. Yes, you going to hear your share of neat stuff, but unless you have a high end receiver, you aren’t going to know what you are missing by using a low end portable shortwave radio.

So, with this preliminary understanding of field in which we are working, this installment of *MT First Look* will compare the Kaito KA1102 (Grove RCV02 \$79.95) and the Eton S350DL (Grove RCV04 \$99.95).

### KAITO KA1102

#### Inside the Box

The first thing I noticed when I took the radio out of the box was its size. Dimensions are 5.62 inches (143mm) x 3.46 inches (88 mm) x 1.12 inches (28.5 mm) and it weighs 9.8 oz. (280 grams), excluding the three batteries. This radio can be thrown into a briefcase or purse for travel.

Accessories included in the box include a carrying pouch, operating manual (plus a simple operating guide), AC adapter, three Ni-MH rechargeable

batteries, stereo earphones, external antenna (SW/FM only), and a wrist strap with stand support.

The manual was ok. I have seen better. There was no explanation to the beginner as to what shortwave is, etc. The typeset is a bit small due to the small size of the manual itself, but it is logically laid out.

#### On-the-Air Testing

During our testing, we used the venerable Sony 2010 as our bench mark receiver. The first notable advantage by the Kaito was in FM broadcast band reception. It beat the 2010 hands down when using only the whip antennas. But we did notice some images on the lower frequencies from the high end of the band. AM and shortwave sensitivity was much better on the 2010.

The receiver has good audio – not great, but given the size of the speaker (2.6 inches) it was interesting to hear some reasonable audio from such a small package. There was a noticeable audio improvement when I moved to headphones. However, they do not use a line out jack as the instruction manual indicates. The audio levels change using the volume control. I did notice that at times, depending on signal strength, the narrow AM filter had a detrimental effect on the received audio.

Receiver selectivity was surprising good for this price range. I was particularly pleased with the FM selectivity which is usually an afterthought. But what really surprised me about the 1102 was the inclusion of SSB reception capability. However, there is a negative here, also (see negatives below).

This is a dual conversion receiver. While that is good, we noticed more images, etc. when we

#### MT First Look Rating (0-10 scale)

##### Kaito KA1102 Receiver

|                                      |   |
|--------------------------------------|---|
| Audio Quality.....                   | 6 |
| Audio Levels.....                    | 6 |
| Back light/Display .....             | 6 |
| Battery Life.....                    | 7 |
| Dynamic Range .....                  | 5 |
| Ease of use .....                    | 6 |
| Feature Set .....                    | 7 |
| Keyboard/Button/Control Layout ..... | 7 |
| Sensitivity.....AM-5, FM-6, SW-5     |   |
| Selectivity.....AM-6, FM-6, SW-6     |   |
| Overall Construction .....           | 8 |
| Overall Reception.....               | 7 |
| Overall Manual .....                 | 5 |

connected it to an external antenna as compared to the same setup for the Sony 2010. AM reception was very good (see below), but FM reception was better on this radio than on the Eton and Sony. Shortwave reception was about equal to the other two radios, but the Eton and Sony were slightly better on the higher shortwave bands.

And for those who like tuning around, there was no chugging when tuning the 1102 like you have with the older Sony.

#### The 1102 Negatives

As I have said many times, no radio is perfect, and we are talking about a \$79.95 portable, so the Kaito has a few skeletons in its closet.

Tuning SSB signals is a chore. Yes, there is a SSB button on the side of the receiver, but it only receives SSB as long as the button is pushed. In order to put it into the SSB *mode*, you have to go through a convoluted procedure to keep it in that mode. There is no USB/LSB: instead, the radio uses a SSB fine tuning control to home in on SSB signals.

The learning curve for this radio is much steeper than the 2010 or even the Eton radio reviewed in this article. What makes this more difficult is its much smaller screen. If you are nearsighted, you will not have a pleasurable experience using the Kaito KA1102.

AM reception compared to the Sony and Eton was not as good – probably the result of a smaller ferrite loop coil inside the radio compared to the other two radios. The external antenna on the Kaito only works on the shortwave/FM bands, so AM broadcast band reception is not as good as on the other two radios.

I did note a bit of synthesizer noise



MT Rating: 2 1/4 Stars ★★☆☆☆

while tuning around; the Eton reviewed below had none. This is probably a direct result of the tuning methods used by the two portables.

There are few other quirks we noted, but this didn't affect overall reception.

Table 1 is a listing of manufacturer specs and key features.

**Table 1: Kaito KA1102  
Manufacturer Specs/Key Features**

|                       |                                                                                                                                  |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Frequency Coverage:   | 520-1710 kHz with 1/9/10 kHz steps – selectable                                                                                  |
| Medium Wave           |                                                                                                                                  |
| Shortwave             | 3.00-29.99 MHz with 1/5 kHz steps – selectable                                                                                   |
| FM Band               | 70.0-108.0 MHz with 10/50/100 kHz steps – selectable                                                                             |
| Conversion            | MW & SW dual conversion                                                                                                          |
| Bandwidths            | Wide-Narrow AM/SW, Mono/stereo selectivity for FM                                                                                |
| Freq/Meter Conversion | SW meter band indicator/conversion                                                                                               |
| Attenuator            | Local-DX switch                                                                                                                  |
| Tuning Options        | Digital frequency readout with manual tuning/speed change tuning/auto scan/memory scan/direct tuning and SSB fine tuning control |
| Memory Locations      | 190 random presets pages 1-6; band preset pages 7-9; ATS preset page 0, has Auto tune/Auto memory                                |
| Indicators            | LED light signal strength (AM/SW four levels/FM three levels), includes a stereo reception indicator, battery level indicator    |
| Clock function        | 12/24 hour selectable, Sleeping time direct entry 1-99 minutes                                                                   |
| Audio Control         | Push button                                                                                                                      |
| Tone select           | News/music switch, FM stereo bass (earphones only)                                                                               |
| Backlighting          | Display/keyboard light                                                                                                           |
| Antennas              | Telescopic antenna for FM and shortwave and built in ferrite bar antenna for AM, plus external jack.                             |
| External Jacks        | Earphone jack (stereo on FM), antenna jack, both are 3.5 mm diameter jacks                                                       |
| Speaker               | 2.6 inches (66 mm) in diameter                                                                                                   |
| Power Source          | Battery: 3 AA rechargeable Ni-MH batteries (recharging time 1-9 hours); external power: DC 6V 300mA; includes an AC-DC adapter   |

## ETON S350DL

### Inside the Box

The first thing that becomes obvious is the Eton S350DL is much bigger than the Kaito. The S350DL is 12.4 inches wide (315 mm) x 7 inches high (6.88 mm) x 3-1/2 inches (89 mm) deep. And it weighs a bunch more than the Kaito – 3 lb. 4 oz. (1.48 Kg).

Accessories included in the box included an operating manual, AC adapter, whip antenna (SW/FM only), and a very nice carrying strap attached to the radio.

The manual was good, well laid out and easy to read, and the radio is very easy to operate. The thing that grabbed me when I first turned it on was the receiver audio. It is among best I have heard for a radio in this price category. There are even separate treble and bass controls (which the Kaito doesn't have).

As mentioned above, no synthesizer noise was noted (the older Grundig Satellite 800 was plagued with this).

The LCD display is very nice, sharp,

and has good contrast when viewed from a various angles. Backlit illumination can be turned on or off, and, when changing frequencies, the LCD backlight automatically comes on while tuning.

AM, FM and SW reception is good, with the AM and low band SW reception is a little better than the Kaito.

### The S350DL Negatives

One of my biggest complaints with the 350 is the tuning arrangement. This radio uses an analog tuning set-up of string-pulley-gears. To be honest, tuning was sloppy at best. Getting on and staying on frequency can be a chore. It was especially noticeable when smaller tuning steps were selected. There was a little too much play and backlash in this tuning setup for my taste and no way to change the tuning to improve these characteristics.

When you changed between AM-FM-SW bands on the Kaito, the frequency was where you left it when you returned to a band. Not so with the 350. If you did some tuning on one band and switched back to the previous band, your frequency will have changed. Also, the band selector switch (AM-SW1-SW2-SW3) can be touchy and is in a bad location.

| MT First Look Rating (0-10 scale)<br>Eton S350 DL Receiver |   |
|------------------------------------------------------------|---|
| Audio Quality.....                                         | 7 |
| Audio Levels.....                                          | 7 |
| Back light/Display .....                                   | 7 |
| Battery Life .....                                         | 8 |
| Dynamic Range .....                                        | 3 |
| Ease of use .....                                          | 8 |
| Feature Set .....                                          | 5 |
| Keyboard/Button/Control Layout .....                       | 4 |
| Sensitivity.....AM-6, FM-5, SW-6                           |   |
| Selectivity.....AM-6, FM-6, SW-6                           |   |
| Overall Construction .....                                 | 6 |
| Overall Reception.....                                     | 6 |
| Overall Manual.....                                        | 6 |

The on/off switch also activates the sleep timer and requires the user to hold down the power switch three seconds in order to keep the radio powered on. The onboard clock appears to lose time over long periods.

Another real negative with the 350 is the lack of SSB reception capability. You definitely have the frequency coverage, but have no ability to receive any SSB signals with this radio. That means that well over 75% of the shortwave spectrum cannot be monitored on the Eton S350DL.

However, my biggest complaint with this radio is the fact that it is single conversion. This



**MT Rating: 2 Stars** ★★☆☆☆

does not bode well for connecting external antennas to improve reception – as our on-air test bore out. We found a lot more images with this radio than made us happy, even just using the external whip antenna.

Table 2 is a listing of manufacturer specs and key features.

**Table 2: Eton S350DL  
Manufacturer Spec/Key Features**

|                     |                                                                                                                                                             |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Frequency Coverage: | 530-1710 kHz                                                                                                                                                |
| Medium Wave         |                                                                                                                                                             |
| Shortwave           | 3.00 to 28.00 MHz                                                                                                                                           |
| FM band             | 88-108 MHz                                                                                                                                                  |
| Conversion          | Single                                                                                                                                                      |
| Attenuation         | Variable RF gain control                                                                                                                                    |
| Bandwidths          | Wide-Narrow AM/SW, Mono/stereo selectivity for FM                                                                                                           |
| Tuning Options      | Analog tuner (string-pulley-gear hardware) with digital frequency readout. Main tuning knob and independent fine-tuning control knob. AM/SW frequency lock. |
| Memory Locations    | None                                                                                                                                                        |
| Indicators          | Four level (eight bar) signal strength indicator, battery level indicator                                                                                   |
| Clock function      | Digital clock with selectable 12/24 hour format, wake-up timer (use as radio-play alarm clock) and sleep timer.                                             |
| Audio Control       | Rotary volume control                                                                                                                                       |
| Tone Select         | Variable, independent bass and treble control                                                                                                               |
| Antennas            | Telescopic antenna for FM and shortwave and built in ferrite bar antenna for AM, plus external jack for supplementary AM, FM and shortwave antennas         |
| External Jacks      | Supplementary jacks for AM, FM and shortwave antennas, line outputs stereo, earphone socket in stereo.                                                      |
| Speaker             | 4 inches (101.6 mm) in diameter                                                                                                                             |
| Misc Features       | Low-pass filter for shortwave and AM reception, and strap type carrying handle.                                                                             |
| Power Source        | 4 D or 4 AA batteries (not included) or AC Adapter (included)                                                                                               |

Note: Published specs subject to change

### ❖ Bottom Line – Head-to-Head

When we tested both these radios it was quite evident that manufacturers have come a long way in the last decade in improving the under-\$100 portable radio category. I can see some distinct markets for both radios.

The Kaito will have a wide appeal to the traveler. You get a lot of bang for the buck using this radio, including SSB reception. I was particularly pleased with the FM reception on the 1102.

The Eton is a listener's delight. It has some of the best audio in its class. I call this a retro radio because of its tuning mechanism and overall feature set. It reminds me of some of the old Panasonic portables back in the late '70s and early '80s, and based on some testing we did with the few we have in house, it compared favorably with those vintage models (except in dynamic range). So, if you want to monitor some overseas programming and are not interested in SSB monitoring, the Eton S350DL is worthy of placement in your receiver complement.

But who won, you ask?

The Kaito KA1102 was the victor in this head-to-head competition, and priced at \$79.95, well worth the bucks. There is a lot of performance in that small, barely 10-ounce package.



## Staying Up To Date! New Versions of a Few Monitoring Programs

A good programmer is never finished with his program. Once written and put into use, possible modifications and improvements continue to haunt the author. In my management career in the high tech industry I cannot count the times I had to threaten termination if programmers didn't stop modifying and tweaking their work!

It has been about fifteen months since we looked at the updates available for some of our favorite radio programs. In addition, in the intervening time we have looked at a number of new programs, which may have been updated.

### ❖ Starting Where We Left Off

In our last update column in November 2005, we reported on updates for Spectrum Lab, RxPlus, Shortwave Log, RadioMax, RF Space's SDR-14 software, Flex Radio's SDR-1000 software, MixW and HamScope. So, first we'll see what have they done since we last looked at them. Then we'll update programs we covered in the past year.

#### Spectrum Lab

This VLF radio/audio "lab-in-a-box" software can be configured as a specialized audio analyzer, filter, frequency converter, hum filter, data logger, VLF receiver, spectrum analyzer or real-time audio processor – to name a few applications! The last version we looked was Spectrum Lab V2.5 b8 (built 2005-08-31).

The latest release is Spectrum Lab V2.7 b12 (built 2006-11-24) and here are some added key features (See Figure 1):

- \* The radio-direction finder can now suppress noise from up to three independent directions, and a new spectrum-event-logging feature was added (right-click into the waterfall to see it).

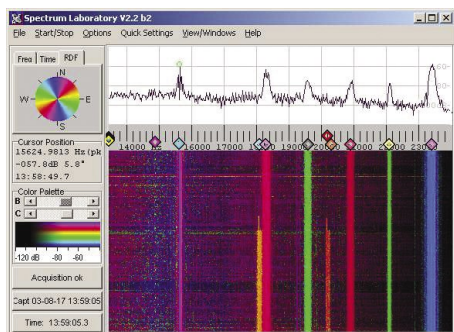


Figure 1 – Spectrum Lab screenshot in "Color Direction Finder" mode, VLF spectrum, color bearing

- \* Remote control functions for certain radios through the serial port (first supported: Icom's CI-V protocol)
- \* Improved FFT-based filter now works as an audio pitch shifter too.
- \* Spectrum graph can be switched to "bar-graph" mode.
- \* Changing of parameters automatically during transmission now possible.
- \* FFT-based filter now supports I/Q-processing; including frequency conversion.
- \* Bat Converter added - If you have a suitable soundcard, you can use SpecLab to make ultrasonic bat calls visible and audible in real-time!
- \* Two SpectrumLabs programs running on one PC can now communicate with each other, using the "send"-command.
- \* A "multi-strip" waterfall option added.
- \* An option to control a transmitter through a "pilot tone" (instead of the serial port).
- \* Added an HTTP server for remote viewing (and control) via LAN.

Download this extremely versatile program from [www.qsl.net/dl4yhf/spectra1.html](http://www.qsl.net/dl4yhf/spectra1.html)

#### RxPlus

Last time we looked at version 1.82, this "do everything for SWling" program worked great with *loads* of receivers. Version 1.91 has even more great features.

- \* Band Monitor Scan Mode – This scan mode is continuous. When the end of the selected band is reached, the scan resumes at the beginning. Shades of color are used with each new scan "run" displayed on top of the scan display window.
- \* Full support for the ILG AND HFCC Databases.

Still one of my favorites, RxPlus 1.91 is a shortwave receiver controller, a DSP audio processor, a digital modes decoder, a database manager and so very much more. Go to its site at [www.cam.org/~noelbou/RxPlus/](http://www.cam.org/~noelbou/RxPlus/) and see all the amazing functions of RxPlus.

#### SWLog

This program's roots go back to 1990! With constant upgrades and rewrites, the current version of SWLog Version 2 Build 2411 provides:

- \* Shortwave Log, the original logging application
- \* Radio Control Server, control over two dozen receivers
- \* RCSweb, a web page to control any of the above receivers
- \* Chat, swap DX news in real time with others

- \* Audio Recording & Scheduler, make recordings of broadcasts
- \* Pocket SWLog, a version for Pocket PCs

That's quite a list of functions! Version 5, which is in beta testing, promises even more. Check it out at [www.shortwavelog.com/index.html](http://www.shortwavelog.com/index.html)

And, it's still free!

#### RadioMax

This is one of my all-time favorite, easy-to-use radio programs. RadioMax version 5.22 was the latest version we looked at. From the website [www.datadeliverydevices.com/RadioMax.htm](http://www.datadeliverydevices.com/RadioMax.htm) it appears that this program has not undergone any new revisions. Give the demo a try.

#### RF Space's Spectravue

RF Space's SDR-14 was one of the first and finest software definable radios (SDR) available to the consumer market. From radio astronomy to radio monitoring, the SDR-14 does it all and very well. (See Figure 2.) Today its customer list includes consumer, government and military users.

Spectravue provides the operating system for using this state-of-the-art SDR. The last version was beta 2.00 -07. The current version 2.10 (2006-07-02) supports these formats: USB, LSB, AM, FM, WFM, CW, CWr and DSB. Filter bandwidths are now continuously adjustable. DRM is now supported via special demo mode using third-party software (DREAM).

The latest version of SpectraVue supports a network SDR-14™. Server software is available for Windows and Linux platforms. A linux

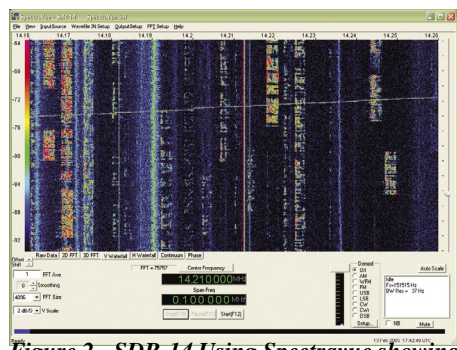


Figure 2 - SDR-14 Using Spectravue showing SSB portion of the 20 meter band with heavy QRN. The government sweeper can be seen as it sweeps up the band. (From RF Space website)



USB driver is now available for the SDR-14™. A new 190 kHz BW (bandwidth) mode has been added. The latest Spectravue version can be downloaded at [www.moetronix.com/svdownload.htm](http://www.moetronix.com/svdownload.htm). Check out RF Space's homepage at [www.rfspace.com/index.html](http://www.rfspace.com/index.html).

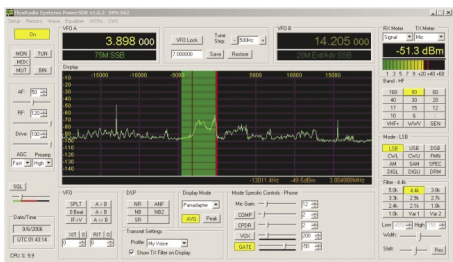
### FlexRadio's PowerSDR

And talking about software definable radios, Flexradio's SDR-1000 transceiver and receiver-only products are true state-of-the-art radio products. The PowerSDR program provides a user-friendly interface. (See Figure 3)

Last time it was version 1.4. Today the current version is 1.6.2, with 1.6.3 in beta testing. They are available at [www.flex-radio.com/](http://www.flex-radio.com/).

New features include:

Transmit (TX) Profiles - quick switching of all of the TX options including TX low/high filter cuts, compression on/off and level, compander on/off and level, TXEQ on/off and settings, and the front panel Mic setting, VOX operation, Display Peak Hold, new ISO standard equalizer for RX and TX, support for the UCB (Universal Controller Board), 1/3 and 2/3 Octave Graphic Equalizer, CW Keying by external programs/keys, Virtual Audio Card support enabling third party software to easily integrate with PowerSDR software without having to use a second sound card.



**Figure 3 - FlexRadio's PowerSDR Version 1.6.2 main screen for control of the SDR-1000 transceiver.**

And as if that weren't enough, there is more: Wave Options added to select pre/post processing; WDM-KS Audio support; Digital Modes (DIGU and DIGL) added with RTTY and SSTV click tuning aids; VAC Auto-Enable for digital modes; DirectX Display modes; AGC fast channel; custom AGC settings enabled; complex LMS routines for automatic noise reduction and automatic notch filtering are implemented; Fast channel AGC operation/settings optimized; More CW options; AM carrier level control; quick QSY enabled option added to setup form; higher sample rate support; receive AGC hang threshold implemented; two new TX meters added; XIT, RIT, and SPLT can now work concurrently; offset for I,Q provided for in DSP; display click 'n' drag features; added filter width modes; variable offset click tuning for DIGL/DIGU; keyboard shortcuts control added; panadapter zoom and pan controls and the addition of small last 3 digits on VFO.

The people at FlexRadio have been really busy! The SDR-1000 just keeps getting better and better.

### MixW

MixW is a multimode program for hams but is also very useful to SWLers. MixW does

not require a TNC. It supports CAT system for many transceiver types: Icom, Kenwood, Yaesu, Ten-Tec, Elecraft and JRC.

MixW supports TNCs, antenna rotors, antenna switches, regular and contest logging formats. It allows using TCP/IP connection over AX.25 packet radio protocol.

We last looked at version 2.15. The latest version of MixW is version 2.17 (Nov-1-2006). It now supports the following modes: SSB, AM, FM, CW, BPSK31, QPSK31, FSK31, RTTY, Packet (HF/VHF), Pactor (RX only), AMTOR (FEC), MFSK, Hellschreiber, Throb, Fax (RX only), SSTV, MT63.

Major features added since version 2.15: a separate program to check sound card sample rate is added, Multimedia keyboard support, RigExpert Plus interface is automatically set up (if detected) and Next Track button now increases the transceiver's frequency by 0.1 kHz.

Download the free (time-limited) trial MixW at [www.mixw.net/index.htm](http://www.mixw.net/index.htm)

### HamScope

HamScope decodes PSK31 RTTY, ASCII (7 bit and 8 bit), MFSK16, PACKET and CW. In addition, it provides radio control interface for several ICOM, TenTec, Kenwood, and Yaesu transceivers.

HamScope is a free program that is used by other free radio programs. Version 1.55, which we looked at last time, is still the current version. It is available at [www.qsl.net/hamscope/HamScope.html](http://www.qsl.net/hamscope/HamScope.html)

## ❖ Recent Radio Program Updates

Now let's take a look at what updates are available for programs we reviewed in the past 12 months. The parentheses indicate in which issue of *MT* we discussed the program in the *Computers & Radio* column.

### RadioControl (April 06)

No change to the basic program with RadioControl version 1.0 still current. However, new 1.1.0-M3 ICOM drivers now include some significant added features, such as – operation of multiple radios over one serial port, forwarding of frequency and mode changes at the radio to the RadioControl program display, access to special radio memory banks/channels, adjustment of radio settling time in device configuration and use of device-internal scanner for RadioControl scan operations.

These are excellent additions to an already feature-rich, top class, monitoring program. See all that it can do at [www.radiocl.com/english/index.html](http://www.radiocl.com/english/index.html)

### RecAll (Feb 06)

No new version to this very useful audio recording program. Version 1.4 beta 12 is still current. Go to [www.sagebrush.com](http://www.sagebrush.com) and download a trial version of RecAll-Pro. The full version costs \$29.95. RecAll-Audio Capture, with fewer features, is available for \$14.95.

### ACARSD (June 06)

This program has lots of unique features,

decodes all ACARS information and displays it in ways usually found in expensive ACARS programs. All for **free**. Version 1.65 is still the latest. Get the free download at [www.acarsd.org](http://www.acarsd.org).

### ACARS Log Analyzer (Oct 06)

This extremely useful freeware program is available on the Internet at [www.acarsonline.co.uk](http://www.acarsonline.co.uk). It logs ACARS decodes and then presents them in a variety of useful and user friendly formats. Log Analyser works with several ACARS decoders including PC-HFDL, ACARSD, SkySpy, Airmaster, and AirNav, to name a few. It can handle both live feeds as well as log files. Version 1.7.6 is still current.

### DxMonitor (Nov 06)

A great compendium of useful monitoring functions, all under the umbrella of one application. Version 1.07 is the latest. A thirty-day free, fully functional trial version is available for downloading at [www.benlo.com/dxmon.html](http://www.benlo.com/dxmon.html).

### PC-HFDL (Sept. 06)

This excellent program decodes both short-wave (HF) and VHF ACARS signals. There's no change to main program version 2.031; however, numerous updates have been made in data files. The full-featured commercial version of PC-HFDL v2.031 can be purchased on-line for \$35 and downloaded at [www.chbrain.dircon.co.uk/pchfdl.html](http://www.chbrain.dircon.co.uk/pchfdl.html). You can download the program and use it for ten minutes without charge.

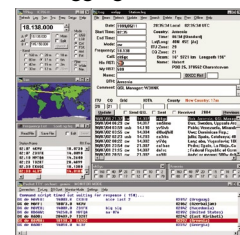
### Omni-Rig

Though not specifically reviewed, we used this program as a rig control building block for a number of programs. An updated rig description file dated Aug 19, 2006, is available at [www.dxatlas.com/OmniRig/](http://www.dxatlas.com/OmniRig/)

### YPLog (May 06)

This is a powerful radio control and logging program – a must-have for ham contesters. We looked version 4.48 of this logging and control program. (See Figure 4.) Version 4.49 is now out. **However**, there is a warning on the Internet, which states, "Restore YPlog 4.48 because of bugs in YPlog 4.49. Please replace your existing 4.49 version with the older 4.48 version."

Therefore, better stick with version 4.48 for now! Download it at [www.qsl.net/ve6yp/](http://www.qsl.net/ve6yp/)



**Figure 4- Look at all that's happening with YPLog !**

## ❖ That's It!

So there you have it. Check your favorite program's website for updates. Windows Vista compatibility? I think new versions will be required. As for me, that is not a consideration. I'll let Microsoft work out all the kinks over the next few **years** with paying customers before I jump to a new operating system. Till next time, try to stay current and warm.

# What's NEW

## Tell them you saw it in Monitoring Times

### RatTail Antenna Booster

One look at this passive antenna booster will tell you where it got its name! The RatTail is designed to increase your transmitting effectiveness when using a handheld radio in the marine, aircraft or 2m ham radio bands, but it also helps improve reception on handhelds. By transforming your radio's 1/4 wave vertical to a 1/2 wave dipole antenna, it results in an increase in transmitted energy of 9 to 12db (800% - 1600%) when measured at a distance of 2 kilometers or more.



The radiation pattern from a handheld radio is not normally horizontal, so much energy is lost to the sky. The RatTail lowers the radiation pattern to make it almost horizontal so that much more energy is delivered to the distant radio. The difference in signal strength will be more noticeable by distant radios than by one that is nearby. Since the antenna is also matched more closely to the radio, it is also possible to use lower power settings, extending operating time.

On a dual band ham radio, the stock antenna is a compromise antenna that has about a 12dB loss compared to a proper 2m rubber antenna. The RatTail typically restores the dual band's 2m efficiency to that of a full 1/4 wave vertical.

There is an optimal place to mount the RatTail on each model of radio to get the maximum increase in efficiency. The clever RatTail design uses the built-in red light in the eye of the rat as a signal strength indicator. As you transmit while moving the plate around to various locations near the bottom of the radio, the eye will glow brightest when the best mounting spot is found. The antenna is simply



mounted using the strip of supplied Velcro™.

Because the Rattail Antenna Booster attaches to the bottom of the radio, unlike other devices that connect to the BNC connector, the RatTail cannot damage the antenna or BNC mounting. If it gets pulled, it simply pops off the radio without doing any harm.

The RatTail Antenna Booster evolved out of experimentation by members of the Victoria Communications Club in about 1996. It sells for \$24.95 in U.S. dollars or \$29.95 Canadian, airmail shipping included. To order, email [rattail@rattailantenna.com](mailto:rattail@rattailantenna.com) or write to Microsec R&D Inc, 1226 Lyall St., Victoria, BC V9A 5G9

### Eton E1XM Partial Recall

A recent enquiry reminded us that not all users or purchasers of used radios may be aware of the following announcement.



The U.S. Consumer Product Safety Commission announced a voluntary recall of about 1,700 Eton E1XM-Model AM/FM/SW/XM-Ready Radios. It was discovered that the battery in this radio can overheat and possibly rupture when using the AC adapter, posing a fire and burn hazard to consumers – though Eton had received only one report of a battery overheating and no injuries were reported.

The E1XM-model radios that are included in the recall have serial numbers from 3,067 through 5,642. The serial number is listed

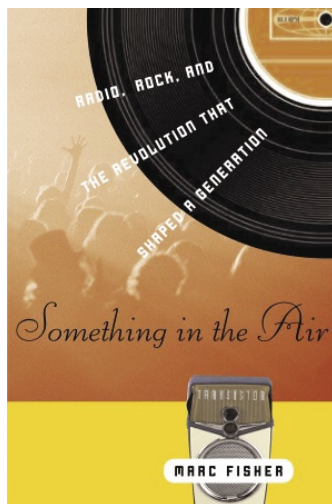
underneath the flap on the back of the unit. These units were sold by retailers from November 2004 through February 2006 for about \$500.

According to the notice, consumers should stop using the recalled radios immediately and call Etón Corp. for a refund or replacement product: Etón Corp. (800) 872-2228 8 a.m.- 4:30 p.m. PT Monday - Friday, or visit [www.etoncorp.com](http://www.etoncorp.com)

### Something in the Air

Subtitled "Radio, Rock, and the Revolution That Shaped a Generation," this new book by Marc Fisher is a great read – especially since I guess I belong to that generation! Most "radio history" books have been written about the colorful beginnings of radio, but this book covers an equally-turbulent time. When television threatened its demise, radio instead experienced a rebirth by reinventing itself as the voice of a new generation and a new kind of music.

Award-winning *Washington Post* journalist Marc Fisher recounts the birth and heyday of Top 40 radio and the radio pioneers who crashed through the color barriers. Far from dry, this history of radio comes alive through the people whose voices came to us over the airwaves – folks like the night-time personalities of Jean Shephard and Bob Fass, deejays and announcers like Tom Donahue, Lee Abrams, Hunter Hancock, and Don Miller.



Fisher follows the era to its close when talk radio supplanted rock and roll and conglomerates consolidated the independent stations.

Then, as now, radio was a reflection of the issues and tensions of the times, so rock and roll, race relations, anti-war sentiments, payola, sex, and drugs all played a part.

But Fisher doesn't stop there – you're little more than halfway through the book. He continues the evolution through Rush Limbaugh, Howard Stern, and even the backlash to the Janet Jackson Superbowl episode. He addresses radio's future challenges of low power FM stations, satellite radio, and podcasting.

Fisher covers demographics; who listens to national public radio? the shock jocks? political talk shows? He looks at why media moguls make the decisions they do about what programming to pick, what music to play, when to sell the station. He looks at individual stations, what worked and why.

Because Marc Fisher is writing about the radio backdrop to our lives, it is stimulating to be reminded of the radio of our youth, through our young adult and child-rearing years, and into our current listening. For those of us not in the industry, there may be some surprises behind what shaped the media that has been such a part of our world.

If you care about all that radio has been and what it will be in years to come, you owe it to yourself to read this book. And maybe you'll decide to become another of radio's pioneers. For, despite the decisions made by "the shirts," the indelible impression left by this book is that radio was, is now, and will still be shaped by individuals with a passion for broadcasting.

*Something in the Air* is published by Random House and was scheduled to arrive in book stores in early January; suggested price is \$27.95.

*Reviewed by Rachel Baughn*

Books and Equipment for announcement or review should be sent to What's New, c/o Monitoring Times, 7540 Highway 64 West, Brasstown, NC, 28902. Press releases may be faxed to 828-837-2216 or emailed to [Rachel.Baughn@monitoringtimes.com](mailto:Rachel.Baughn@monitoringtimes.com).



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Attention all those wanting to know what's going on with ham radio in the New Orleans area, check out: <http://groups.yahoo.com/group/GNOAmateurRadio/>

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